

**LOWER ARSENAL MIXED USE SPECIFIC PLAN
ENVIRONMENTAL IMPACT REPORT**
**RECIRCULATION OF NOISE AND GLOBAL CLIMATE CHANGE,
ENERGY USE AND SUSTAINABILITY SECTIONS**



STATE CLEARINGHOUSE #2007062021

LSA

August 2009

**LOWER ARSENAL MIXED USE SPECIFIC PLAN
ENVIRONMENTAL IMPACT REPORT**

**RECIRCULATION OF NOISE AND GLOBAL CLIMATE CHANGE,
ENERGY USE AND SUSTAINABILITY SECTIONS**

STATE CLEARINGHOUSE #2007062021

Submitted to the:

City of Benicia
250 East L Street
Benicia, CA 94510

Prepared by:

LSA Associates, Inc.
2215 Fifth Street
Berkeley, CA 94710
510.540.7331

LSA

August 2009



**COMBINED NOTICE OF AVAILABILITY OF SELECT TOPICAL SECTIONS OF
THE LOWER ARSENAL MIXED USE SPECIFIC PLAN DRAFT ENVIRONMENTAL
IMPACT REPORT (DEIR) AND NOTICE OF PUBLIC HEARING ON THE DRAFT EIR**

PROJECT TITLE: Lower Arsenal Mixed Use Specific Plan

PROJECT SPONSOR: City of Benicia

PROJECT LOCATION: The project site is located in the City of Benicia in Solano County. The project site consists of approximately 50 acres east of Downtown Benicia, and is a portion of Benicia's former Arsenal known as the Lower Arsenal. The site is generally bounded by lands adjoining I-780 on the north, lands adjoining I-680 on the east, Port of Benicia land and the Carquinez Strait on the south, and residential neighborhoods extending into downtown Benicia on the west.

BRIEF DESCRIPTION OF PROJECT: The proposed project includes implementation of a Specific Plan for the Lower Arsenal site, which is designated for mixed uses in the Benicia General Plan. The Specific Plan covers four distinct zones, each of which exhibits a unique physical character. The Specific Plan would implement a form-based code to shape future development on the project site, with primary emphasis on the physical form and character of new development. After build-out of the Specific Plan, the area would contain approximately 741,865 square feet of mixed uses, 22 residential units, and 6.39 acres of open space. The Specific Plan area currently contains approximately 525,000 square feet of mixed uses. The Draft Specific Plan is available for public review at the City's Community Development Department or on the web:
http://beniciaca.govoffice2.com/index.asp?Type=B_BASIC&SEC={B38B0ADD-399B-44DE-95BD-90551B12A45D}

ENVIRONMENTAL REVIEW: The Lower Arsenal Mixed Use Specific Plan Draft Environmental Impact Report (DEIR) was released for public and agency review on July 19, 2007. Public/agency review ended on September 6, 2007. Select sections of the Draft EIR (Section IV.E, Hazards and Hazardous Materials and Section IV.K, Cultural and Paleontological Resources) were recirculated on April 22, 2008 in accordance with *California Environmental Quality Act (CEQA) Guidelines* section 15088.5. A Response to Comments (RTC) Document was prepared and circulated in August 2008 that addresses all comments received on the Draft EIR, including the recirculated sections.

This current recirculation of select topical sections from the DEIR has been prepared to update and provide additional analysis of the Specific Plan. Two sections are being recirculated: Section IV.I, Noise and Section IV.N, Global Climate Change, Energy Use, and Sustainability (formerly Section IV.N, Sustainability and Energy). This recirculation is not required pursuant to CEQA or the *CEQA Guidelines* because none of the criteria listed in *CEQA Guidelines* section 15088.5 for recirculation of an EIR (e.g., the identification of a new or more severe environmental impact, or a new mitigation measure/project alternative, or a finding that the EIR is inadequate) have been met. The purpose of this recirculation is to provide decisionmakers and the public with an opportunity to review new information added to the EIR. Copies of the recirculated sections are available for review or distribution to interested parties at no charge at the City of Benicia Community Development Department, 250 East "L" Street, Benicia, CA 94510, Monday through Friday, 8:30 a.m. to noon, and 1:00 p.m. to 5:00 p.m.

PUBLIC HEARING: The City of Benicia Planning Commission and Historic Preservation Review Commission will jointly conduct a public hearing on the DEIR on Thursday, September 24, 2009 at 6:30 p.m. in the City Council Chambers (250 East “L” Street, Benicia). The City of Benicia is requesting that reviewers limit their comments to the recirculated materials. Comments may be made at the public hearing described above, or in writing. There is no fee for commenting, and all comments received will be considered by the City prior to finalizing the EIR and making a decision on the project. Written comments should be sent to the attention of Damon Golubics, Principal Planner, City of Benicia, 250 East “L” Street, Benicia, CA 94510, no later than 4:00 p.m. on Wednesday, October 7, 2009. For further information, please e-mail Damon Golubics at Damon.Golubics@ci.benicia.ca.us.

Charlie Knox
Public Works Director
Community Development Director
Date: August 24, 2009

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
IV.I.	NOISE	5
IV.N.	GLOBAL CLIMATE CHANGE, ENERGY USE AND SUSTAINABILITY	27

FIGURES

Figure IV.I-1:	Monitoring Locations Map	9
Figure IV.I-2:	<u>Noise Monitoring Locations in Supplemental Noise Study</u>	17

TABLES

Table IV.I-1:	Typical A-Weighted Sound Levels	6
Table IV.I-2:	Existing (2006) Baseline Traffic Noise Levels	8
Table IV.I-3:	Short-Term Ambient Noise Monitoring Results, dBA.....	8
Table IV.I-4:	Meteorological Conditions During Ambient Noise Monitoring	10
Table IV.I-5:	Summary of EPA Noise Levels.....	10
Table IV.I-6:	Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}	11
Table IV.I-7:	Maximum Allowable Noise Exposure for New Noise Sensitive Uses From Transportation Noise Sources	12
Table IV.I-8:	Noise Level Performance Standards for Noise-Sensitive Land Uses Which May Be Affected by Stationary Noise Sources	12
Table IV.I-9:	Noise Exposure by Development Zone.....	18
Table IV.I-10:	Typical Construction Equipment Maximum Noise Levels, L_{max}	20
Table IV.I-11:	Existing Plus Project Traffic Noise Levels	22
Table IV.I-12:	Cumulative Without Project Traffic Noise Levels.....	22
Table IV.I-13:	Cumulative Plus Project Traffic Noise Levels	22
Table IV.N-1:	Global Warming Potential of Greenhouse Gases.....	29
Table IV.N-2:	Specific Plan Greenhouse Gas Emissions	46
Table IV.N-3:	Specific Plan Compliance with Greenhouse Gas Emission Reduction Strategies	48
Table IV.N-4:	Sustainability and Energy Conservation Matrix.....	51

I. INTRODUCTION

A. INTRODUCTION

This recirculation of select topical sections from the Lower Arsenal Mixed Use Specific Plan Draft Environmental Impact Report (EIR) has been prepared to update and provide additional analysis of the Specific Plan. Two sections are being recirculated: Section IV.I, Noise and Section IV.N, Global Climate Change, Energy Use, and Sustainability (formerly Section IV.N, Sustainability and Energy). This recirculation is not required pursuant to the California Environmental Quality Act (CEQA) or the *CEQA Guidelines*, because none of the criteria listed in *CEQA Guidelines* section 15088.5 for recirculation of an EIR (e.g., the identification of a new or more severe environmental impact, or a new mitigation measure/project alternative, or a finding that the EIR is inadequate) have been met. The purpose of this recirculation is to provide decisionmakers and the public with an opportunity to review new information added to the EIR.

The Lower Arsenal Mixed Use Specific Plan Draft EIR was released for public and agency review on July 19, 2007. During and after the public/agency review period (which formally ended on September 6, 2007), 21 comment letters were submitted. Select sections of the Draft EIR (Section IV.E, Hazards and Hazardous Materials and Section IV.K, Cultural and Paleontological Resources) were recirculated on April 22, 2008 in accordance with *CEQA Guidelines* section 15088.5. The public was notified of the availability of the recirculated sections and they were made available through the same process as the Draft EIR. The CEQA-mandated 45-day public comment period was extended by an extra 46 days and ended on July 22, 2008. Ten letters were received on the recirculated sections. A Response to Comments (RTC) Document was prepared and circulated in August 2008 that addresses all comments received on the Draft EIR, including the recirculated sections.

Due to the passage of time and changes in the regulatory environment, as well as additional comments received after the RTC Document was circulated, new information is again incorporated into the Draft EIR analysis. However, this new information is not considered “significant new information” as defined by *CEQA Guidelines* section 15088.5, such that recirculation would be required.

New information is considered significant under *CEQA Guidelines* section 15088.5 when: “The EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project’s proponents have declined to implement.” The changes made to Sections IV.I and IV.N of the Draft EIR do not meet any of these criteria.

This document includes: 1) instructions for submitting comments on the recirculated materials; 2) a summary of new information that is being added to the Draft EIR; and 3) complete copies of Sections IV.I, Noise and IV.N, Global Climate Change, Energy Use, and Sustainability, of the Draft EIR that include new information introduced since publication of the Draft EIR and RTC Document.

B. COMMENTING ON THE RECIRCULATED EIR

These recirculated materials will be released for public/agency review for 45 days. Submit all comments to Damon Golubics, Principal Planner, City of Benicia, 250 East L Street, Benicia, CA 94510, by October 7, 2009. The City of Benicia is requesting that reviewers limit their comments to the recirculated materials (Sections IV.I, Noise and IV.N, Global Climate Change, Energy Use, and Sustainability). Comments received during the recirculation period will be addressed in a forthcoming RTC Document.

Questions and comments regarding the preparation of these materials and City review of the project should be directed to:

Charlie Knox, Community Development Director
City of Benicia
250 East L Street
Benicia, CA 94510

C. NEW INFORMATION

New information has been added to Sections IV.I, Noise and IV.N, Sustainability and Energy, of the Draft EIR. All revisions made to these sections are included herein. The page numbers of each section are those of the complete EIR

The new information added to Section IV.I, Noise includes a summary of the analysis and conclusions provided in a November 2, 2007 supplemental noise study of the project site prepared by Rosen Goldberg Der and Lewitz, and submitted on behalf of the Port of Benicia as part of a comment letter on the Draft EIR, dated March 10, 2008. The data and conclusions presented in that submittal are incorporated into Section IV.I, but do not alter the impact conclusions described in the Draft EIR. The new information added to this section is shown via underlined text; deleted text is shown via the ~~strikeout~~ feature.

The new information added to Section IV.N, Global Climate Change, Sustainability and Energy includes an analysis of global climate change, pursuant to Assembly Bill (AB) 32, Executive Order S-3-05, Senate Bill (SB) 375, and recent guidance from the Office of Planning and Research (OPR) and other agencies. In April 2009, proposed amendments to the *CEQA Guidelines* were released by the OPR. These proposed amendments state that a lead agency should make a good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas (GHG) emissions resulting from a project.

The updated section includes the following information related to global climate change:

- A description of the State and regional setting and climate/meteorological conditions in the Specific Plan area. The findings of the City of Benicia *Greenhouse Gas Emissions Inventory Report*¹ (which was prepared subsequent to the 2007 Draft EIR and the 2008 recirculated Draft EIR) are also discussed.

¹ Benicia, City of, 2008. *City of Benicia Greenhouse Gas Emissions Inventory Report*. September.

- A description of the existing regulatory framework for global climate change which identifies applicable federal, State, and local policies, regulations, and programs, including the recently-proposed amendments to the *CEQA Guidelines* by the OPR.
- A quantitative assessment of energy use and greenhouse gas emissions associated with sources related to the Specific Plan, including construction and rehabilitation activities, new vehicle trips, electricity consumption, water usage, and solid waste generation and disposal.
- Significance criteria that provide thresholds for evaluating global climate change impacts.
- A discussion of the effects of climate change on the project.

Because the information added to this section is extensive (and required a reorganization of the existing section), the added information is shown as normal text (and not as underline or ~~strikeout~~). No new impacts or mitigation measures were identified as a result of this addition of new information.

I. NOISE

This section describes existing noise conditions in the vicinity of the Plan Area, describes criteria for determining the significance of noise impacts, and discusses the impacts of the Draft Specific Plan – both in term of the project’s noise-generating qualities and its potential to expose persons to unacceptable noise levels. Where appropriate, mitigation measures are recommended to reduce impacts to a less-than-significant level.

1. Setting

The setting section begins with an introduction to several key concepts and terms that are used in evaluating noise. It then explains the various agencies that regulate the noise environment in the City of Benicia and summarizes key standards that are applied to Draft Specific Plan. This setting section concludes with a description of current noise sources that affect the Plan Area and the noise conditions that are experienced in the vicinity of the Plan Area.

a. Characteristics of Sound. To the human ear, sound has two significant characteristics: pitch and loudness. A specific pitch can be an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound’s effect. This characteristic of sound can be precisely measured with instruments.

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation or sleep. Several noise measurement scales exist that are used to describe noise in a particular location. A *decibel* (dB) is a unit of measurement that indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3.0 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3.0 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness. Sound intensity is normally measured through the *A-weighted sound level* (dBA). This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Table IV.I-1 shows representative outdoor and indoor noise levels in units of dBA.

Noise impacts can be organized into three categories. The first is audible impacts, which refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater, since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Table IV.I-1: Typical A-Weighted Sound Levels

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments
Near Jet Engine	140	Deafening
Civil Defense Siren	130	Threshold of Pain
Hard Rock Band	120	Threshold of Feeling
Accelerating Motorcycle at a few feet away	110	Very Loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud
Ambulance Siren; Food Blender	95	Very Loud
Garbage Disposal	90	Very Loud
Freight Cars; Living Room Music	85	Loud
Pneumatic Drill; Vacuum Cleaner	80	Loud
Busy Restaurant	75	Moderately Loud
Near Freeway Auto Traffic	70	Moderately Loud
Average Office	60	Moderate
Suburban Street	55	Moderate
Light Traffic; Soft Radio Music in Apartment	50	Quiet
Large Transformer	45	Quiet
Average Residence Without Stereo Playing	40	Faint
Soft Whisper	30	Faint
Rustling Leaves	20	Very Faint
Human Breathing	10	Very Faint

Source: Compiled by LSA Associates, Inc., 2005.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level is. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6 dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise sensitive receptor of concern. There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

Another noise scale often used together with the L_{max} in noise ordinances for enforcement purposes is noise standards in terms of percentile exceedance noise levels. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level: half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

b. Existing Noise. Primary noise sources in and around the Plan Area and associated noise levels are described below.

(1) Existing Vehicular Traffic Noise Levels. Vehicular traffic is a major source of ambient noise in urban settings and the Plan Area is no exception. The existing traffic noise levels for roadway segments around Plan Area are listed in Table IV.I-2. This table was generated from data including roadway traffic volumes, vehicle speeds, and roadway geometry, using the Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77-108). Existing noise levels along select roadway segments in the vicinity of the Plan Area (at 50 feet outward from the centerline of the outermost travel lane) range from 55.3 dBA CNEL to 63.6 dBA CNEL. According to noise exposure contours in the City's General Plan¹, traffic noise levels from I-680 reach 60 dBA L_{dn} for only a small portion of the extreme northeast section of the Plan Area. Because noise associated with vehicles on I-680 does not significantly contribute to high noise levels within the Plan Area, noise from this roadway is not further analyzed in this section.

(2) Existing Railroad Noise Levels. The Southern Pacific Railroad (SPRR) line passes within 1,200 feet of the Plan Area. The railroad line is located on the eastern side of I-680, the opposite side of the freeway from the project site. There is a spur that enters the Port area for loading and unloading. The Port of Benicia separates the Plan Area from the Carquinez Strait. The Port is privately owned and operated and primarily functions as an automotive distribution facility. Railroad loading facilities that operate within the Port are located within 200 feet of the Plan Area.

(3) Existing Aircraft Noise Levels. Oakland International Airport is located approximately 21 miles south of the Plan Area. Buchanan Field Airport is located approximately 5 miles south of the Plan Area adjacent to the City of Concord. Napa County Airport is located approximately 13 miles to the northwest of the Plan Area. Travis Air Force Base is located approximately 17 miles northeast of the Plan Area. Based on the Travis Air Force Base Land Use Compatibility Plan (June 2002)² and the Buchanan Field FAR Part 150 Study (June 2006)³, the Plan Area is located outside of the 60 dBA noise contours associated with these airport flight paths.

(4) Other Ambient Noise Sources. Ambient noise sources in the vicinity of the Plan Area include the operational noise sources of the Port of Benicia and industrial activities within the Plan

¹ Benicia, City of, 1999. City of Benicia General Plan, 1999.

² Travis Air Force Base, 2002. Travis Air Force Base Land Use Compatibility Plan. Figure 2B Noise Contours. June 13.

³ Buchanan Field Airport, 2006. FAR Part 150 Study. Figure D20 Future Base Case 2012 CNEL Noise Contours. June.

Table IV.I-2: Existing (2006) Baseline Traffic Noise Levels

Roadway Segment	ADT ^a	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
East 5th Street - I-780 EB Ramps to Military East	9,900	< 50 ^b	< 50	106	63.6
East 5th Street - Military East to East K Street	5,300	< 50	< 50	70	61.4
Military East - East 2nd Street to East 4th Street	5,700	< 50	< 50	91	62.6
Military East - East 5th Street to East 7th Street	6,100	< 50	< 50	95	63.5
Adams Street - Military East to Park Road	2,000	< 50	< 50	< 50	57.2
Grant Street - Adams Street to Park Road	1,300	< 50	< 50	< 50	55.3
Park Road - Bayshore Road to Elm Street	1,600	< 50	< 50	< 50	57.7

^a Average daily traffic volume.

^b Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.

Source: LSA Associates Inc., May 2007.

Area. Operational noises include loading and unloading operations of ships, trains and trucks, as well as light industrial noise sources such as metal shop and auto repair work.

An LSA noise technician conducted short-term ambient noise monitoring on the project site on May 16, 2007 between the hours of 11:30 a.m. and 4:15 p.m. at five separate locations. The purpose of this noise monitoring was to document the existing noise environment and capture the noise levels associated with operations and activities in the Plan Area. Table IV.I-3 lists the noise levels measured during the short-term 20-minute noise measurements. Maximum and minimum noise levels were recorded as well as the equivalent continuous noise level measure L_{eq} . The maximum noise levels all reflect vehicular traffic noise sources. The meteorological conditions at the time of each noise measurement are shown in Table IV.I-4. Figure IV.I-1 shows the monitoring locations.

Table IV.I-3: Short-Term Ambient Noise Monitoring Results, dBA

Location	Start Time	L_{eq} ^a	L_{max} ^b	L_{min} ^c	Noise Sources
(1) #1060 Grant Street, behind Command Post Building	11:55 a.m.	52.2	68.8	44.9	Machinery in road-construction storage yard, trucks in port area
(2) #921 Jefferson Court, 4 feet from edge of street, 105 feet from Park Road	12:55 p.m.	52.5	69.2	43.3	Road construction equipment on Park Street, traffic on Park Street & Adams Street
(3) #849 Jackson Street, 120 feet west of J.R. Schneider Co. building compressor	1:45 p.m.	68.8	73.8	66.4	Compressor by J.R. Schneider building, truck unloading activity
(4) Polk Street, behind #983 Grant Street building	2:15 p.m.	59.6	83.2	42.0	Soldering/metal sanding work from metal shop on Polk Street, traffic on Polk Street
(5) #835 Military East, 10 feet from edge of road	3:45 p.m.	61.3	76.0	45.2	Traffic on Military East / Grant Street

^a L_{eq} represents the average of the sound energy occurring over the 20-minute time period.

^b L_{max} is the highest instantaneous sound level measured during the 20-minute time period.

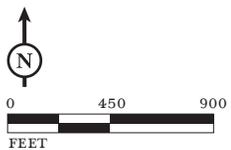
^c L_{min} is the lowest instantaneous sound level measured during the 20-minute time period.

Source: LSA Associates, Inc., May 2007.



LSA

FIGURE IV.I-1



PLAN AREA



NOISE MONITORING LOCATIONS

Lower Arsenal Mixed Use Specific Plan EIR
Noise Monitoring Locations

Table IV.I-4: Meteorological Conditions During Ambient Noise Monitoring

Location	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (F)	Relative Humidity (%)	Comments
1	9.0	4.1	71	38	Clear skies, wind from the West
2	7.9	2.5	73	48	Clear skies, wind from the West
3	7.1	2.8	75	32	Clear skies, wind from the West/ Northwest
4	9.4	2.3	74	34	Clear skies, wind from the West
5	6.4	1.9	75	34	Clear skies, wind from the West

Source: LSA Associates, Inc., May 2007.

2. Noise Regulatory Framework.

The following section summarizes the regulatory framework related to noise, including federal, State, and the City of Benicia policies, plans and standards.

(1) U.S. Environmental Protection Agency (EPA). In 1972 Congress enacted the Noise Control Act, authorizing the EPA to publish descriptive data on the effects of noise and establish levels of sound “requisite to protect the public welfare with an adequate margin of safety.” These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table IV.I-5. The EPA cautions that these identified levels are not standards because they do not take into account cost or feasibility.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dB. The “(24)” signifies an L_{eq} duration of 24 hours. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dB are summarized in Table IV.I-6. At 55 dB L_{dn} , 95 percent sentence clarity (intelligibility) may be expected at 3.5 meters, and little community reaction to noise levels. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

Table IV.I-5: Summary of EPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March.

(2) **State of California.** The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the “State Noise Insulation Standard,” it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. However, the City has adopted and modified the State’s land use compatibility guidelines, as discussed below.

(3) **City of Benicia General Plan.** The City of Benicia addresses noise in both the Noise Element of the General Plan⁴ and in Chapter 8.20 and 15.28 of the Municipal Code⁵. The following are the City of Benicia’s Goals, Policies and Programs from the Noise Element of the General Plan that relate to the proposed Draft Specific Plan. The Noise Element of the General Plan adopts the “Maximum Allowable Noise Exposure for New Noise Sensitive Uses From Transportation Noise Sources” chart which is shown in Table IV.I-7 and the “Maximum Allowable Noise Exposure for New Noise-Sensitive Uses From Stationary Noise Sources” chart, which is shown in Table IV.I-8.

Table IV.I-6: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meters. 99 percent sentence intelligibility (average) at 1.0 meters. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below “vigorous action.”
Complaints	1 percent dependent on attitude and other non-level related factors*.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, 1974.
“Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March.

*Non-level related factors refer to personal factors (like personality or sensitivity to noise).

⁴ Benicia, City of, 1999. *General Plan, Chapter 4. Community Health and Safety, D. Noise.*

⁵ Benicia, City of, 2006. *Municipal Code, Chapter 8.20 and 15.28.* August 1.

Table IV.I-7: Maximum Allowable Noise Exposure for New Noise Sensitive Uses From Transportation Noise Sources

Land Use	Outdoor Activity Areas ^a L _{dn} /CNEL, dB	Interior Spaces	
		L _{dn} /dB	L _{eq} /dB ^b
Residential	60 ^c	45	—
Transient Lodging	65 ^d	45	—
Hospitals, Nursing Homes	60 ^c	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls	60 ^c	—	40
Office Buildings, Commercial Uses, Industrial, Manufacturing, Utilities ^e	—	—	45
Schools, Libraries, Museums	60 ^c	—	45
Playgrounds, Neighborhood Parks	65	—	—

^a Where the location of outdoor activity areas is unknown, or does not exist, the exterior noise level standard will be applied to the property line of the receiving land use. Refer to glossary for definition of outdoor activity area.

^b As determined for a typical worst-case hour during periods of use.

^c Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. If these noise levels cannot be complied with, this will constitute a significant environmental impact.

^d In the case of hotel/motel facilities or other transient lodging, with no proposed outdoor activity areas such as pool areas, only the interior noise level criterion will apply.

^e Standards would only apply to areas requiring good speech intelligibility such as offices, conference rooms, etc.

Source: City of Benicia General Plan, 1999. Chapter 4: Community Health and Safety, D. Noise

Table IV.I-8: Noise Level Performance Standards for Noise-Sensitive Land Uses Which May Be Affected by Stationary Noise Sources

Land Use	Exterior Hourly L _{eq} , dB		Interior Hourly L _{eq} , dB	
	Daytime	Nighttime	Daytime	Nighttime
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Residential	55	50	40	35
Transient Lodging	55	50	40	35
Hospitals	—	—	40	35
Nursing Homes	55	50	40	35
Theaters, Auditoriums	—	—	35	35
Churches	55	50	40	40
Schools	55	50	45	45
Libraries	55	50	45	45

Source: City of Benicia General Plan, 1999. Chapter 4: Community Health and Safety, D. Noise

Community Noise

- **Goal 4.23:** Reduce or eliminate the effects of excessive noise.
 - **Policy 4.23.1:** Evaluate the compatibility of proposed projects with respect to existing and future transportation noise levels by utilizing Tables 4-3 and 4-4 [see Tables IV.I-7 and IV.I-8].
 - **Policy 4.23.4:** Control development of noise-sensitive land uses in areas exposed to existing or projected noise which exceed the levels specified in Tables 4-3 and 4-4 unless the project includes specific, effective mitigation measures to reduce interior and exterior noise levels to those specified in Tables 4-3 and 4-4 [see Tables IV.I-7 and IV.I-8].

- **Policy 4.23.5:** Accommodate roadway improvement projects for build-out of the General Plan by recognizing that existing noise-sensitive uses may be exposed to increased noise levels from roadway repairs, increased traffic, and increased travel speeds. When it is not practical to reduce traffic noise levels to those in Table 4-4 [see Table IV.I-7], the following criteria will be used as a test of significance for the environmental review of roadway improvement projects:
 - (a) Where existing noise levels are less than 60 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant;
 - (b) Where existing noise levels range between 60 and 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 3 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant; and
 - (c) Where existing noise levels are greater than 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 1.5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant.

Transportation Noise Sources

- Table 4-3 [see Table IV.I-7] provides specific standards for determining the compatibility of proposed noise-sensitive land uses with transportation noise sources. Where noise-sensitive projects are proposed within areas which exceed the standards contained in Table 4-3 [see Table IV.I-7], it is necessary to prepare a report that (a) performs an analysis of noise impacts, and (b) recommends mitigation measures to reduce noise levels on the site to comply with the standards in Table 4-3 [see Table IV.I-7]. This table is only to be used with proposed projects; the City's noise ordinance governs noise associated with existing uses.

Stationary Noise Sources

- Table 4-4 [see Table IV.I-8] provides specific performance standards for determining the compatibility of proposed noise-sensitive land uses with stationary noise sources. The performance standards are for new noise-sensitive developments which may be affected by an existing stationary noise source. The performance standards also apply to new developments that include a stationary noise source which may affect an existing noise sensitive development.

The City of Benicia's Municipal Code⁶ further defines the guidelines for control of noise sources within the City limits of Benicia. The codes that are of particular significance as they relate to implementation of the Specific Plan are outlined as follows:

- *8.20.140 Machinery, equipment, fans and air conditioning.* It is unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-206).
- *8.20.150 Construction of buildings and projects.* It is unlawful for any person within a residential zone, or within a radius of 500 feet there from, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of any one day and 7:00 a.m. of the next day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless beforehand a permit therefore has been duly obtained from the city manager or his designee. No permit shall be required to perform emergency work as defined in BMC 8.20.020. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-301).
- *8.20.190 Ambient base noise level.* Where the ambient noise level is less than designated in this section the respective noise level in this section shall govern.
- *Excavating, grading and filling – Regulations.* The following regulations shall apply to all excavating, grading and filling: All grading and noise there from, including, but not limited to, warming of equipment motors, shall be limited to the hours between 7:00 a.m. and 6:00 p.m., Monday through Saturday, unless other times are specifically authorized in writing by the city engineer for special circumstances

⁶ Benicia, City of, 2006. *Municipal Code, Chapter 8.20 and 15.28.* August 1.

3. Draft Specific Plan

The following Draft Specific Plan actions are applicable to noise:

- *Land Use Action 1.1.7:* Encourage developers to incorporate acoustical site planning into their projects, Recommended measures include:
 - Buffers and/or landscaped berms;
 - Orienting windows and outdoor living areas away from unacceptable noise exposure; and
 - Incorporating state-of-the-art structural sound technology.
- *Land Use Action 1.1.9:* Establish design requirements that require adequate buffers to mitigate potentially incompatible activities.
- *Land Use Action 1.1.10:* All development in the Lower Arsenal Mixed Use Area shall be required to record a deed restriction and include provision in any required Covenants, Conditions and Restrictions to notify future owners that this is a heavy industrial and manufacturing area with uses such as the nearby waste water treatment plant and port related uses that operate 24 hours a day and that are uses dependent on the tides and the Strait.
- *Land Use Action 1.3.3:* Mitigate potentially conflicting land uses within the Adams Street Mixed Use Zone through regulation and creation of internal courtyards within new buildings, designed to internalize light industrial activities that are potentially disruptive, noisy, or visually intrusive to surrounding uses.
- *Land Use Action 1.3.5:* Minimize industrial impacts, such as noise and visual clutter associated with light industry, by internalizing uses within “safe haven” courtyards to minimize conflicting land uses with planned artist spaces, office, or residential uses.
- *Land Use Action 1.5.3:* Allow live/work units where it can be demonstrated that adequate buffers exist, including noise buffers, and that the presence of residents will not significantly constrain industrial operations, including the flow of goods and materials.

4. Impacts and Mitigation Measures

a. Criteria of Significance. A project would have a significant noise impact if it would substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the Plan Area are the State’s noise criteria, the City of Benicia’s Noise Element of the General Plan, and applicable sections of the City’s Municipal Code. For the purposes of this Specific Plan, a noise impact is considered significant if the Specific Plan would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above the levels existing without the project.

b. Less-Than-Significant Noise Impacts. The following noise types/sources would produce less-than-significant noise effects within or near the Plan Area.

(1) **Vibration Impacts.** Specific tenants for proposed industrial and commercial uses have not yet been identified as part of the Specific Plan. However, based on proposed mixed uses, the Specific Plan would not contain sources of perceptible long-term ground borne vibration. Therefore ground borne vibration impacts from implementation of the Specific Plan would be less than significant for people working or residing within or near the Plan Area.

(2) **Railroad Noise Impacts.** The Southern Pacific Railroad (SPRR) line passes within 0.2 miles of the proposed Plan Area. The railroad line is located on the eastern side of Interstate 680 (I-680), the opposite side of the freeway from the Plan Area. Railroad loading facilities that operate within the Port are located within 200 feet of the Plan Area. The railroad loading/unloading area is significantly lower in elevation than the Plan Area. Industrial, commercial, and large storage facilities also block the line of sight from the railroad to the majority of the Plan Area; buildings blocking the line of sight provide at least a 15 dBA reduction in noise levels. Additionally, due to the distance and location of the SPRR line from the site, ambient noise levels at the Plan Area would not be significantly affected by operations on this rail line in terms of 24 hour averaged noise levels such as CNEL or L_{dn} .

(3) **Aircraft Noise Impacts.** Oakland International Airport is located approximately 21 miles south of the Plan Area. Buchanan Field Airport is located approximately 5 miles south of the Plan Area. Napa County Airport is located approximately 13 miles to the northwest of the Plan Area. Travis Air Force Base is located approximately 17 miles northeast of the Plan Area. Based on the Travis Air Force Base Land Use Compatibility Plan (June 2002)⁷ and the Buchanan Field FAR Part 150 Study (June 2006)⁸, the Plan Area is located outside of the 60 dBA noise contours associated with these airport flight paths. Due to the Plan Area's distance from these airports and typical flight path orientation, the noise effect from aircraft noise sources is less than significant for the Plan Area in terms of 24 hour averaged noise levels such as CNEL or L_{dn} .

(4) **Supplemental Noise Study.** A supplemental noise study⁹ was prepared for and submitted to the City on behalf of the Port of Benicia for consideration as part of the environmental review process. The report was submitted as part of a comment letter in the Draft EIR (July 2007) dated March 10, 2008. The report presents the results of long- and short-term noise measurements collected for various periods between August 27 and September 19, 2007 at locations in the Plan Area and at the Port of Benicia. The report quantifies various noise sources, including ship and rail activities, and draws conclusions regarding whether these noise sources would result in unacceptable noise levels in the Plan Area. The following discussion includes a summary of the key findings of the supplemental noise study and a discussion of whether the findings of the report indicate the potential for significant noise-related impacts due to implementation of the Draft Specific Plan. In summary, the data included in the report do not indicate significant noise-related impacts associated with implementation of the Draft Specific Plan.

⁷ Travis Air Force Base, 2002. Travis Air Force Base Land Use Compatibility Plan. Figure 2B Noise Contours. June 13.

⁸ Buchanan Field Airport, 2006. FAR Part 150 Study. Figure D20 Future Base Case 2012 CNEL Noise Contours. June.

⁹ Rosen, Goldberg, Der & Lewitz, Inc., 2007. Environmental Noise Report for: Port of Benicia and the Lower Arsenal Mixed Use Specific Plan, Benicia, CA. Prepared for Dana Dean, Attorney at Law. November 2.

Noise Measurement Locations. Noise measurements were collected to quantify noise emitted by industrial/transportation uses in the vicinity of the Plan Area and to identify noise levels in the area when industrial noise sources are not operating. The following bullet points describe the monitoring locations in the report and the duration of monitoring activities at each location. Figure IV.I-2 shows the noise monitoring locations.

- Location A. Measurements at this location were taken across from the pier where ships off-load their cargo (automobiles). Measurements began at 5:30 p.m. on September 11 and concluded at 2:30 p.m. on September 19, 2007.
- Location B. Measurements at this location were taken on the Port property line at the intersection of Lincoln and Polk Streets, at the boundary of the South of Grant Street Zone. Measurements were taken from 5:30 p.m. on August 27 to 3:30 p.m. on August 28 and from 2:20 p.m. on September 11 to 2:00 p.m. on September 16, 2007.
- Location C. Measurements at this location were taken at the Port property line at the east end of Tyler Street, which forms the eastern border of the South of Grant Street Zone. Measurements began at 10:30 a.m. and ended at 5:20 p.m. on August 28, 2007.
- Location D. Measurements at this location were taken at a speed limit sign at the intersection of Grant and Adams Streets, which is at the eastern boundary of the Adams Street Zone. The noise monitor operated from 10:00 a.m. to 3:30 p.m. on August 28, 2007.
- Location E. Measurements at this location were taken in front of the Jefferson Street Mansion in the Jefferson Ridge Zone. The noise monitor operated from 5:15 p.m. on August 27 to 3:30 p.m. on August 28, 2007.
- Location F. One 45-minute measurement was taken 65 feet south of the railcar loading machine. According to the report, the measurement captured one full cycle of the railcar loading mechanism. No date or time of measurement is provided in the report.
- Location G. Measurements at this location were taken at the south side of the Simpkins Auto Body property within the Adams Street Zone. The measurement began at 3:30 p.m. on September 11 and ended at 2:00 p.m. on September 16, 2007.

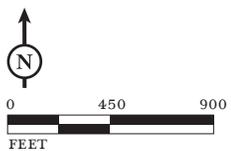
Plan Area Noise Levels. To assess the effects of industrial/transportation noise sources on Specific Plan land uses, the noise report calculates expected noise levels in each of the Specific Plan development zones. These calculations are based on the noise measurements and the distance between the noise sources and the development zones in the Plan Area. The results of these calculations are provided in Table IV.I-9.

The noise report claims that development within all of the Plan Area development zones could be exposed to unacceptable noise levels. The report asserts that existing noise levels exceed the General Plan standards for day and nighttime noise levels, and that noise reductions of up to 23 dBA would be required to meet the General Plan standards for outdoor noise and that reductions of up to 38 dBA would be required to meet General Plan standards for indoor noise.



FIGURE IV.I-2

LSA



PLAN AREA



NOISE MONITORING LOCATIONS

Lower Arsenal Mixed Use Specific Plan EIR
 Noise Monitoring Locations in Supplemental Noise Study

Table IV.I-9: Noise Exposure by Development Zone

Noise Source	A-Weighted Sound Level, dBA							
	South of Grant Street Zone		Grant Street Zone		Adams Street Zone		Jefferson Ridge Zone	
	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Train Switch Operating	61	92	57	88	57	88	56	87
Auto Hauler Service and Maintenance	56	---	42	---	38	---	35	---
Railcar Assembly/Loading	57	81	51	75	48	72	44	68
Ship Engine/Ventilation	59	---	57	---	57	---	56	---
Front End Loader	73	79	54	71	52	69	47	64

L_{eq} = equivalent continuous sound level, which is the total sound energy of time-varying noise over a sample period.

L_{max} = the highest exponential time-averaged sound level that occurs during a stated time period.

Source: Rosen, Goldberg, Der & Lewitz, Inc., 2007.

While the noise study provides additional ambient noise measurements that document transportation and operational noise sources within the Plan Area, the comparison of this data to the City's General Plan noise standards (and associated conclusions regarding the need for noise reductions) is inaccurately presented. As shown in Table IV.I-7, the City's maximum allowable transportation noise exposure standard for new noise-sensitive land uses is 60 dBA L_{dn} for residential outdoor activity areas and 45 dBA L_{dn} for residential interior spaces. All but one of the documented noise sources presented in Table IV.I-9 are transportation noise sources and not stationary sources (the auto hauler service and maintenance use is the only documented stationary source). Therefore, ambient noise measurements of transportation noise sources should be compared to the City's transportation day/night average (L_{dn}) noise standards and not the hourly L_{eq} stationary noise source standards.

For the one documented stationary noise source, the auto hauler service and maintenance noise source, the measured L_{eq} in the South of Grant Street Zone exceeds the City's exterior daytime hourly L_{eq} noise standard of 55 dBA L_{eq} for residential land uses by 1 dBA. The noise measurement documented welding activities that occurred for about 30 minutes. However, according to the City's Noise Element, stationary noise sources should be considered with respect to a typical hour of operation; noise levels associated with unusual peak hour events are exempt from the stationary noise performance standards. Therefore, one documented 30 minute measurement of 56 dBA L_{eq} does not constitute an exceedance of the stationary noise performance standards.

It should also be noted that the recorded noise levels were documented in terms of L_{eq} and not in the same noise level metric as the City's transportation day/night average (L_{dn}) noise standards, and therefore a comparison to the standards is difficult. It is observed that in areas where ambient noise levels drop off significantly at night, the daytime peak hour L_{eq} noise levels are much higher than the day/night average L_{dn} . As documented in the supplemental report, such a drop in ambient noise levels does occur at night within the Plan Area. Only two documented noise measurements, as shown in Table IV.I-9, exceeded 60 dBA L_{eq} : the front end loader with a recorded noise level of 73 dBA L_{eq} and the train switch operations with a recorded noise level of 61 dBA L_{eq} . However, these noise sources are located over 160 and 280 feet, respectively, from the nearest potential development site within the South of Grant Street Zone. Therefore, at this nearest potential development site, noise from the front end loader noise source would attenuate to below 61 dBA L_{eq} , while noise from the train switch operations would attenuate to below 55 dBA L_{eq} . Again, according to this report these

measurements are in terms of the hourly average L_{eq} , while the City's maximum allowable noise exposure standard for new noise-sensitive land uses from transportation noise sources is stated in terms of the 24-hour weighted average L_{dn} . Because the ambient noise levels drop off significantly at night within the Plan Area, as documented in this report, even a conservative noise analysis for the site would show that these measured L_{eq} noise levels would not result in an exceedance of the City's 24-hour average maximum allowable noise exposure standard of 60 dBA L_{dn} from transportation noise sources for new residential land use development.

Therefore, based on the measurements presented in the supplemental noise study, no exceedances of the City's transportation noise source standards for new residential land uses were documented within the Plan Area and potential operational period impacts associated with these noise sources and residential land uses would be less than significant. Also, the lack of exceedances of the City's residential exterior noise standards would also indicate that the interior 45 dBA L_{dn} standard for residential interior spaces would also not be exceeded, based on sound attenuation associated with standard construction practices. Based on the EPA's Protective Noise Levels (EPA 550/9-79-100, November 1978), with a combination of walls, doors, and windows, standard construction for northern California residential buildings provides approximately 25 dBA in exterior-to-interior noise reduction with windows closed and a reduction of approximately 15 dBA with windows open. See the discussion of operational period noise impacts starting on page 265 for a discussion of stationary noise sources associated with Port operations that could exceed the day and nighttime exterior noise thresholds for future noise sensitive land uses in the Plan Area that would border the Port property.

c. Significant Noise Impacts. The following noise sources would produce significant noise levels within or near the Plan Area.

(1) Construction Period Impacts. The Plan Area is currently surrounded by residential, commercial and industrial land uses. Construction related to buildout of the Specific Plan would result in short-term noise impacts on these adjacent land uses, in addition to uses that already exist in the Plan Area. The level and types of noise impacts that would occur during construction are described below.

Impact NOI-1: Construction period activities could create significant short-term noise impacts on adjacent residential properties and on buildings that are currently or would become occupied within the Plan Area before completion of Specific Plan buildout. (S)

Noise levels from construction activities such as finished grading and building construction may range up to 91 dBA L_{max} at 50 feet from the active construction area for a limited time period. The transport of workers and construction equipment and materials to active construction sites would incrementally increase noise levels on access roads leading to the site. Noise from trucks would occur on the site for the duration of the construction period. Workers and construction equipment would use existing access routes. Noise from passing trucks (85 dBA L_{max} at 50 feet) would be similar to existing truck-generated noise.

Noise generated during excavation, grading, and building construction would result in potential noise impacts to off-site and on-site uses. Residential land uses that border the Plan Area may experience short-term noise generated by construction equipment and activities when construction occurs near the Plan Area boundary. Within the Plan Area are live-work land uses, museum land uses, comm-

ercial uses, as well as light industrial land uses. These existing land uses within the Plan Area may also experience high short-term noise levels associated with construction equipment and activities, when individual development projects are constructed.

Construction within the Plan Area is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, and dump trucks. As shown in Table IV.I-10, the typical maximum noise level generated by each bulldozer on an active construction site is assumed to be 88 dBA L_{max} at 50 feet from the operating equipment. The maximum noise level generated by hydraulic backhoes is approximately 86 dBA L_{max} at 50 feet. The maximum noise level generated by water and other trucks is approximately 85 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength would increase the noise level by 3 dBA. Assuming each piece of construction equipment operates at some distance apart from the other equipment, the worst-case combined noise level at the nearest uses to the site during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area. Pile driving is not assumed to be necessary during construction activity and is therefore not addressed in this analysis.

Table IV.I-10: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	68 to 80	77
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Electric Saws	66 to 72	70
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	85 to 90	88
Tractors	77 to 82	80
Front-End Loaders	86 to 90	88
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	85
Air Compressors	76 to 89	85
Trucks	81 to 87	85

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants.*

Construction-related noise impacts would occur throughout full buildout of projects within the Plan Area. Construction-related noise would affect different receptors for varying short-term amounts of time as different projects within the Plan Area are completed.

Implementation of the following multi-part mitigation measure would reduce this potential construction period noise impact to a less-than-significant level:

Mitigation Measure NOI-1a: During all on-site excavation and grading, the project contractors for individual development projects shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards. All heavy construction equipment used on project sites within the Plan Area shall be maintained in good operating condition, with all internal combustion, engine-driven equipment equipped with intake and exhaust mufflers that are in good condition. "Quiet" models of air compressors and other stationary noise sources shall be utilized where such technology exists.

Mitigation Measure NOI-1b: The project contractors for individual development projects shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the construction site.

Mitigation Measure NOI-1c: The construction contractors for individual development projects shall locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the construction site during all project construction. The construction contractors shall post signs prohibiting unnecessary idling of internal combustion engines.

Mitigation Measure NOI-1d: The contractors for individual development projects shall further designate a “noise disturbance coordinator” who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaints (e.g. beginning work too early, bad muffler) and institute reasonable measures warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at all construction sites within the Plan Area.

Mitigation Measure NOI-1e: The construction contractor shall ensure that all noise producing construction-related activities within 500 feet of any residential land uses shall be restricted to the hours of 7:00 a.m. to 10:00 p.m.; all excavating, grading, and filling activity, including, but not limited to, warming of equipment motors, shall be restricted to the hours of 7:00 a.m. to 6:00 p.m. Monday through Saturday. (LTS)

(2) **Operational Period Impacts.** Significant long-term noise impacts that could result from implementation of the Specific Plan include increased traffic noise levels and exposure of sensitive receptors to operational noise impacts. Depending on where buildings are situated and how they are constructed, the interior of some buildings and associated outdoor activity spaces may experience noise levels that exceed appropriate noise standards.

Impact NOI-2: Implementation of the proposed Specific Plan would increase traffic noise levels within the Plan Area and in surrounding areas. (S)

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the Plan Area. The resultant noise levels were weighed and summed over a 24-hour period in order to determine the CNEL values. The existing and future traffic volumes for roadway segments in the Specific Plan vicinity were used in the traffic noise impact analysis. Table IV.I-11 shows anticipated existing plus project traffic noise levels adjacent to the roadway segments in the Specific Plan vicinity. Tables IV.I-12 and IV.I-13 show the predicted cumulative and the cumulative plus project traffic noise levels.

The City’s maximum allowable noise exposure for new noise sensitive land uses from transportation noise sources is 60 dBA CNEL for the following land uses: residential, transient lodging, hospitals, nursing homes, churches, meeting halls, schools, libraries, museums, playgrounds, and neighborhood parks. Exceeding this standard would result in a significant impact. In addition, where existing noise levels are less than 60 dBA CNEL at the outdoor activity area of a noise-sensitive use, a 5 dBA increase in noise levels would be considered significant. Where existing noise levels range between 60 dBA and 65 dBA CNEL at the outdoor activity area of a noise-sensitive use, a 3 dBA increase in noise levels would be considered significant.

Table IV.I-11: Existing Plus Project Traffic Noise Levels

Roadway Segment	ADT ^a	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Existing Conditions
East 5th Street - I-780 EB Ramps to Military East	13,600	< 50 ^b	62	130	64.9	1.3
East 5th Street - Military East to East K Street	5,500	< 50	< 50	71	61.6	0.2
Military East - East 2nd Street to East 4th Street	6,200	< 50	< 50	96	63.0	0.4
Military East - East 5th Street to East 7th Street	10,600	< 50	64	137	65.9	2.4
Adams Street - Military East to Park Road	4,200	< 50	< 50	60	60.4	3.2
Grant Street - Adams Street to Park Road	3,700	< 50	< 50	55	59.9	4.6
Park Road - Bayshore Road to Elm Street	1,900	< 50	< 50	< 50	58.4	0.7

^a Average daily traffic volume. ^b Traffic noise within 50 feet of the roadway centerline requires site-specific analysis.
Source: LSA Associates Inc., May 2007.

Table IV.I-12: Cumulative Without Project Traffic Noise Levels

Roadway Segment	ADT ^a	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
East 5th Street - I-780 EB Ramps to Military East	14,000	< 50 ^b	63	133	65.1
East 5th Street - Military East to East K Street	7,500	< 50	< 50	88	62.9
Military East - East 2nd Street to East 4th Street	7,700	< 50	53	111	63.9
Military East - East 5th Street to East 7th Street	8,500	< 50	55	118	64.9
Adams Street - Military East to Park Road	2,000	< 50	< 50	< 50	57.2
Grant Street - Adams Street to Park Road	1,300	< 50	< 50	< 50	55.3
Park Road - Bayshore Road to Elm Street	2,200	< 50	< 50	< 50	59.0

Source: LSA Associates Inc., May 2007.

Table IV.I-13: Cumulative Plus Project Traffic Noise Levels

Roadway Segment	ADT ^a	Center line to 70 CNEL (feet)	Center line to 65 CNEL (feet)	Center line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane	Increase from Cumulative Conditions
East 5th Street - I-780 EB Ramps to Military East	17,800	< 50 ^b	73	156	66.1	1.0
East 5th Street - Military East to East K Street	7,700	< 50	< 50	89	63.1	0.2
Military East - East 2nd Street to East 4th Street	8,300	< 50	55	117	64.2	0.3
Military East - East 5th Street to East 7th Street	12,900	< 50	73	156	66.7	1.8
Adams Street - Military East to Park Road	4,200	< 50	< 50	60	60.4	3.2
Grant Street - Adams Street to Park Road	3,700	< 50	< 50	55	59.9	4.6
Park Road - Bayshore Road to Elm Street	2,500	< 50	< 50	53	59.6	0.6

Source: LSA Associates Inc., May 2007.

Modeling results indicate that segments of Adams Street would experience significant traffic noise impacts with implementation of the proposed Specific Plan. Adams Street would experience traffic noise levels of up to 60.4 dBA CNEL at 50 feet from the centerline of the outermost travel lane; this represents an increase of 3.2 dBA above conditions without the project. Adams Street's traffic noise levels would exceed the City's maximum allowable noise exposure standard of 60 dBA CNEL for new noise sensitive land uses from transportation noise sources and would result in a greater than 3 dBA increase in traffic noise levels.

In addition to Adams Street, traffic noise levels above 60 dBA would occur outside of the roadway right of way lines for two other roadway segments within the Plan Area. The results show that the 60 dBA CNEL roadway noise contour would extend to 55 feet from the centerline of Grant Street, and to 53 feet from the centerline of Park Road. When noise-sensitive projects are proposed within areas which exceed the standards contained in Table 4-3 [see Table IV.I-7] of the City's General Plan Noise Element, a project specific acoustical analysis must be completed. This analysis must include recommended mitigation measures to reduce traffic noise levels on the project site to below the maximum allowable noise exposure standard of 60 dBA CNEL. Such an acoustical analysis would be required for any proposed noise sensitive development within the 60 dBA CNEL noise contour of these indicated roadway segments. Implementation of the following mitigation measure would reduce this traffic noise impact within the Plan Area to a less-than-significant level:

Mitigation Measure NOI-2: A project-specific acoustical analysis report shall be completed which shall include measures that would reduce traffic noise impacts to below the maximum allowable noise exposure standard of 60 dBA CNEL. These measures shall be incorporated into the project. This analysis shall be performed for all proposed noise sensitive land use development projects in the following areas:

- Within 60 feet of the centerline of Adams Street;
- Within 55 feet of the centerline of Grant Street; and
- Within 53 feet of the centerline of Park Road.

Implementation of this mitigation measure would sufficiently reduce traffic noise levels to comply with the City's General Plan requirements and would mitigate the traffic noise impacts within the Plan Area to a less-than-significant level. (LTS)

Impact NOI-3: Implementation of the proposed Specific Plan would expose sensitive land uses to significant operational noise impacts. (S)

Existing stationary noise sources in the vicinity of the Plan Area include the operational noise sources of the Port of Benicia and industrial and commercial land uses within the Plan Area. The Port of Benicia separates the Plan Area from the Carquinez Strait. The Port is privately owned and operated and primarily functions as an automotive distribution facility. Operational noises include loading and unloading operations of ships, trains and trucks, and the operational noises of moving, parking and storage of up to 42,000 vehicles at one time. Railroad loading facilities that operate within the Port are located within 200 feet of the Plan Area.

Port-related operations are dependent on the tides in Carquinez Strait and often operate 24 hours a day. Such operational noise from the Port could exceed the nighttime noise level performance

standards (shown in Table IV.I-8) for future noise sensitive land uses in the Specific Plan area that would border the Port property. Noise sensitive development within the Specific Plan area would need to incorporate necessary noise attenuation measures to reduce such nighttime noise levels to meet the City's nighttime interior noise level standards.

Noise within the Plan Area would also be generated by industrial, manufacturing, and processing land uses as well as general and business services. These land uses would be permitted in the Adams Street, Grant Street, and South of Grant Street zones. Such land uses would include stationary noise sources such as loading and unloading operations of trucks at commercial and industrial facilities and at self storage facilities. Noise sources also include light industrial noise sources such as metal shop and auto repair work.

Noise sensitive residential land uses would be permitted (typically with a use permit) in every zone of the Specific Plan except for a portion of the South of Grant Street zone: along Jackson Street west of Polk Street and south of Grant Street. The maximum allowable exterior daytime noise exposure from stationary noise sources, as shown in Table IV.I-8, is limited to 55 dBA hourly L_{eq} for the following land uses: residential, transient lodging, nursing homes, churches, schools, and libraries. These performance standards are for new noise-sensitive developments that may be affected by an existing stationary noise source. They also apply to new developments that include a stationary noise source which may affect an existing noise sensitive development. In addition, Municipal Code 8.20.140 prohibits operation of any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device that would cause the noise level at the property line to exceed the ambient base noise level by more than 5 dBA. Ambient noise measurements taken on May 16, 2007 indicate existing operational noise levels from Port and industrial land use operations that currently exist on the site range from 52.2 dBA to 68.8 dBA L_{eq} within the proposed Plan Area.

The Specific Plan's policies address potential noise impacts related to the combination of planned noise sensitive land uses and stationary noise sources within the same zone. Policy recommendations (see section IV.I.3, Draft Specific Plan above) include buffers, landscaped berms, orienting windows and outdoor living areas away from noise sources, incorporating state-of-the-art structural sound attenuating technology, and creating internal courtyards within new buildings designed to minimize light industrial activity noise impacts.

The Specific Plan outlines policies and plans to address the potential noise impacts of a mixed-use project. However, implementation of the following two-part mitigation measure would be required to ensure that stationary noise impacts would be below the daytime exterior noise threshold of 55 dBA hourly L_{eq} and the nighttime exterior noise threshold of 50 dBA hourly L_{eq} .

Mitigation Measure NOI-3a: Project-specific acoustical studies shall be performed for all proposed noise-sensitive development within the Plan Area. The acoustical studies shall describe how the City's exterior and interior performance standards (shown in Table 4-4 [see Table IV.I-8 above] of the Noise Element of the General Plan) for proposed noise sensitive land uses which may be affected by stationary noise sources will be achieved. These acoustical studies must satisfy the requirements set forth in Title 24, Part 2, of the California Administrative Code, Noise Insulation Standards, for multiple-family attached residential units, hotels and motels. These studies must be performed and submitted to the City for review prior to issuance of the City's building permits.

Mitigation Measure NOI-3b: Project-specific acoustical studies shall be performed for all proposed projects within the Plan Area located adjacent to noise sensitive land uses, and that would include the operation of any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device that would generate noise levels in excess of the City's exterior noise standards. These studies shall include mitigation that would reduce these stationary noise impacts to comply with the City's standards set forth in the City's Municipal Code section 8.20.140. These studies must be performed and submitted to the City for review prior to issuance of the City's building permits. (LTS)

Implementation of this mitigation measure would sufficiently reduce stationary noise levels to comply with the City's General Plan and Municipal Code requirements and would mitigate the stationary noise impacts within the Plan Area to a less-than-significant level.

N. GLOBAL CLIMATE CHANGE, ENERGY USE AND SUSTAINABILITY

This section of the EIR discusses the effects of the maximum potential development in the Specific Plan Area from a multi-disciplinary perspective, with a focus on the three interrelated topics of global climate change, energy use, and sustainability. CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects considered for approval. Global climate change can be considered an “effect on the environment” and an individual project or plan’s incremental contribution to global climate change can have a cumulatively significant impact. Cumulative impacts are the collective impacts of one or more past, present, or future projects, that when combined, result in adverse changes to the environment. Climate change is a global environmental problem in which: (a) any given development project contributes only a small portion of any net increase in greenhouse gases (GHGs) and (b) global growth is continuing to contribute large amounts of GHGs across the world. Therefore, this section addresses climate change primarily as a cumulative impact.

Closely related to global climate change are the issues of sustainability and energy, which have only recently become topics of considerable interest in CEQA documents. Although sustainable development guidelines have been adopted by cities, counties, and State agencies throughout California, the State *CEQA Guidelines* have not been revised to specifically require a substantive analysis of how development projects affect the long-term uses of resources (although CEQA Guidelines Section 15126.2(c) requires an analysis of significant irreversible changes that would result from a development project, including changes in land use that would commit future generations, irreversible changes from environmental actions, and the consumption of non-renewable resources).

1. Global Climate Change Setting

The following discussion provides an overview of global climate change, its causes and potential effects, and a summary of emission sources and inventories. The regulatory framework relating to global climate change is also summarized. The global climate change information and analysis provided in this report rely primarily on the Climate Action Team 2006 Final Report, Intergovernmental Panel on Climate Change (IPCC) Assessment Reports, various California Air Resources Board (ARB) staff reports, and other related global climate change documents that provide background information on the impacts of greenhouse gas emissions.

a. Global Climate Change Background. A description of global climate change and its sources are provided below.

Global climate change is the observed increase in the average temperature of the Earth’s atmosphere and oceans along with other significant changes in climate (such as precipitation or wind) that last for an extended period of time. The term “global climate change” is often used interchangeably with the term “global warming,” but “global climate change” is preferred to “global warming” because it helps convey that there are other changes in addition to rising temperatures. Global surface temperatures have risen by $0.74^{\circ}\text{C} \pm 0.18^{\circ}\text{C}$ over the last 100 years (1906 to 2005). The rate of warming over the last 50 years is almost double that over the last 100 years.¹ The prevailing scientific opinion on climate change is that most of the warming observed over the last 50 years is attributable to human

¹ Intergovernmental Panel on Climate Change (IPCC), 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.*

activities. The increased amounts of carbon dioxide (CO₂) and other GHGs are the primary causes of the human-induced component of warming. GHGs are released by the burning of fossil fuels, land clearing, agriculture, and other activities, and lead to an increase in the greenhouse effect.²

GHGs are present in the atmosphere naturally, are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced global climate change are:³

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF₆)

Over the last 200 years, human activities have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, and enhancing the natural greenhouse effect, which is believed to be causing global warming. While manmade GHGs include naturally-occurring GHGs such as CO₂, methane, and N₂O, some gases, like HFCs, PFCs, and SF₆ are completely new to the atmosphere.

Certain other gases, such as water vapor, are short-lived in the atmosphere. Others remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is excluded from the list of GHGs above because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation. For the purposes of this EIR, the term “GHGs” will refer collectively to the gases listed above only.

These gases vary considerably in terms of Global Warming Potential (GWP), which is a concept developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The global warming potential is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere (“atmospheric lifetime”). The GWP of each gas is measured relative to carbon dioxide, the most abundant GHG. The definition of GWP for a particular greenhouse gas is the ratio of heat trapped by one unit mass of the greenhouse gas to the ratio of heat trapped by one unit mass of CO₂ over a specified time period. GHG emissions are typically measured in terms of pounds or tons of “CO₂ equivalents” (CO₂eq). Table IV.N-1 shows the GWPs for each type of GHG. For example, sulfur hexafluoride is 22,800 times more potent at contributing to global warming than carbon dioxide. The following discussion summarizes the characteristics of the six primary GHGs.

² The temperature on Earth is regulated by a system commonly known as the “greenhouse effect.” Just as the glass in a greenhouse lets heat from sunlight in and reduces the amount of heat that escapes, greenhouse gases like carbon dioxide, methane, and nitrous oxide in the atmosphere keep the Earth at a relatively even temperature. Without the greenhouse effect, the Earth would be a frozen globe; thus, although an excess of greenhouse gas results in global warming, the *naturally occurring* greenhouse effect is necessary to keep our planet at a comfortable temperature.

³ The greenhouse gases listed are consistent with the definition in Assembly Bill (AB) 32 (Government Code 38505), discussed later in this section.

Table IV.N-1: Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide	50-200	1
Methane	12	25
Nitrous Oxide	114	298
HFC-23	270	14,800
HFC-134a	14	1,430
HFC-152a	1.4	124
PFC: Tetrafluoromethane (CF ₄)	50,000	7,390
PFC: Hexafluoromethane (C ₂ F ₆)	10,000	12,200
Sulfur Hexafluoride (SF ₆)	3,200	22,800

Source: IPCC, 2007. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

(1) Carbon Dioxide (CO₂). In the atmosphere, carbon generally exists in its oxidized form, as CO₂. Natural sources of CO₂ include the respiration (breathing) of humans, animals and plants, volcanic outgassing, decomposition of organic matter, and evaporation from the oceans. Human-caused sources of CO₂ include the combustion of fossil fuels and wood, waste incineration, mineral production, and deforestation. Natural changes to the carbon cycle work slowly, especially compared to the rapid rate at which humans are adding CO₂ to the atmosphere. Natural removal processes, such as photosynthesis by land- and ocean-dwelling plant species, cannot keep pace with this extra input of man-made CO₂, and consequently, the gas is building up in the atmosphere. The concentration of CO₂ in the atmosphere has risen about 30 percent since the late 1800s.⁴

In 2002, CO₂ emissions from fossil fuel combustion accounted for approximately 98 percent of man-made CO₂ emissions and approximately 84 percent of California's overall GHG emissions (CO₂eq). The transportation sector accounted for California's largest portion of CO₂ emissions, with gasoline consumption making up the greatest portion of these emissions. Electricity generation was California's second largest category of GHG emissions.

(2) Methane (CH₄). Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans. Anthropogenic sources include rice cultivation, livestock, landfills and waste treatment, biomass burning, and fossil fuel combustion (burning of coal, oil, natural gas, etc.). Decomposition occurring in landfills accounts for the majority of human-generated CH₄ emissions in California, followed by enteric fermentation (emissions from the digestive processes of livestock).⁵ Agricultural processes such as manure management and rice cultivation are also significant sources of manmade CH₄ in California. Methane accounted for approximately 6 percent of gross climate change emissions (CO₂eq) in California in 2002.⁶

⁴ California Environmental Protection Agency, 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

⁵ California Air Resources Board, Greenhouse Gas Inventory Data - 1990 to 2004. <http://www.arb.ca.gov/cc/inventory/data/data.htm>. Accessed November 2008.

⁶ Ibid.

It is estimated that over 60 percent of global methane emissions are related to human-related activities.⁷ As with CO₂, the major removal process of atmospheric methane – a chemical breakdown in the atmosphere – cannot keep pace with source emissions, and methane concentrations in the atmosphere are increasing.

(3) Nitrous Oxide (N₂O). Nitrous oxide is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. Nitrous oxide is a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion emit N₂O, and the quantity emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N₂O emissions in California. Nitrous oxide emissions accounted for approximately 7 percent of man-made GHG emissions (CO₂eq) in California in 2002.

(4) Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF₆). HFCs are primarily used as substitutes for ozone-depleting substances regulated under the Montreal Protocol.⁸ PFCs and SF₆ are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in California; however, the rapid growth in the semiconductor industry, which is active in California, leads to greater use of PFCs. HFCs, PFCs, and SF₆ accounted for about 3.5 percent of man-made GHG emissions (CO₂eq) in California in 2002.⁹

(5) Temperature Increase. The latest projections, based on state-of-the-art climate models, indicate that temperatures in California are expected to rise 3 to 10.5°F by the end of the century.¹⁰ Because GHGs persist for a long time in the atmosphere (see Table V.N-1), accumulate over time, and are generally well-mixed, their impact on the atmosphere cannot be tied to a specific point of emission.

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation and reduction in sunlight from the addition of GHGs and other gases to the atmosphere from volcanic eruptions); and

⁷ IPCC, 2007. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

⁸ The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to protect the ozone layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for ozone depletion.

⁹ California Environmental Protection Agency, 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

¹⁰ California Climate Change Center, 2006. *Our Changing Climate. Assessing the Risks to California*. July.

- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., from deforestation, reforestation, urbanization, and desertification).

The primary effect of global climate change has been a rise in the average global tropospheric¹¹ temperature of 0.2°C per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling shows that further warming could occur, which would induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of California could include, but are not limited to:

- The loss of sea ice and mountain snow pack, resulting in higher sea levels and higher sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures;
- Rise in global average sea level primarily due to thermal expansion and melting of glaciers and ice caps in the Greenland and Antarctic ice sheets;
- Changes in weather that include widespread changes in precipitation, ocean salinity, and wind patterns, and more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones;
- Decline of the Sierra Nevada snowpack, which accounts for a significant amount of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years;
- Increase in the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas of Los Angeles and the San Joaquin Valley by the end of the 21st century; and
- High potential for erosion of California's coastlines and seawater intrusion into the Delta and levee systems due to the rise in sea level.

b. Emissions Sources and Inventories. An emissions inventory that identifies and quantifies the primary human-generated sources and sinks of GHGs is a well-recognized and useful tool for addressing climate change. This section summarizes the latest information on global, United States, California, and local GHG emission inventories.

(1) Global Emissions. Worldwide emissions of GHGs in 2004 were 27 billion metric tons of CO₂eq per year.¹² Global estimates are based on country inventories developed as part of programs of the United Nations Framework Convention on Climate Change (UNFCCC).

(2) U.S. Emissions. In 2004, the United States emitted about 7.3 billion metric tons of CO₂eq or about 25 tons/year/person. Of the four major sectors nationwide – residential, commercial, industrial and transportation – transportation accounts for the highest amount of GHG emissions

¹¹ The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

¹² Combined total of Annex I and Non-Annex I Country CO₂eq emissions. United Nations Framework Convention on Climate Change (UNFCCC), 2007. *Greenhouse Gas Inventory Data*. Information available at http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php and http://maindb.unfccc.int/library/view_pdf.pl?url=http://unfccc.int/resource/docs/2005/sbi/eng/18a02.pdf.

(approximately 35 to 40 percent); these emissions are entirely generated from direct fossil fuel combustion. Between 1990 and 2006, total U.S. GHG emissions rose approximately 14.7 percent.¹³

(3) State of California Emissions. According to ARB emission inventory estimates, California emitted approximately 480 million metric tons¹⁴ of CO₂eq emissions in 2004.¹⁵ This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth lowest per-capita carbon dioxide emission rate from fossil fuel combustion in the country, due to the mild climate of the State's densely-populated coastal zone (which reduces energy consumption for heating and cooling), and the success of its energy efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of what it would have been otherwise.¹⁶

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO₂eq) was as follows:

- Carbon dioxide (CO₂) accounted for 83.3 percent;
- Methane (CH₄) accounted for 6.4 percent;
- Nitrous oxide (N₂O) accounted for 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF₆) accounted for 3.5 percent.¹⁷

The ARB estimates that transportation is the source of approximately 38 percent of the State's GHG emissions in 2004, followed by electricity generation (both in-State and out-of-State) at 23 percent, and industrial sources at 20 percent. The remaining sectors of GHG emissions are residential and commercial activities at 9 percent, agriculture at 6 percent, high global warming potential gases at 3 percent, and recycling and waste at 1 percent.¹⁸

ARB is responsible for developing and updating the California Greenhouse Gas Emission Inventory. This inventory estimates the amount of GHGs emitted to and removed from the atmosphere by human activities within the State of California and supports the AB 32 Climate Change Program. ARB's current GHG emission inventory covers the years 1990-2004 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, agricultural lands, etc.). The emission inventory estimates are based on the actual amount of all fuels combusted in the State, which accounts for over 85 percent of the GHG emissions within California.

¹³ U.S. Environmental Protection Agency (EPA), 2008. The U.S. Greenhouse Gas Emissions and Sinks: Fast Facts. http://www.epa.gov/climatechange/emissions/downloads/2008_GHG_Fast_Facts.pdf.

¹⁴ A metric ton is equivalent to approximately 1.1 tons.

¹⁵ California Air Resources Board, Greenhouse Gas Inventory Data - 1990 to 2004. <http://www.arb.ca.gov/cc/inventory/data/data.htm>. Accessed November 2008.

¹⁶ California Energy Commission (CEC), 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 - Final Staff Report, publication # CEC-600-2006-013-SF, Sacramento, CA, December 22, 2006; and January 23, 2007 update to that report.

¹⁷ California Environmental Protection Agency, 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

¹⁸ California Air Resources Board (ARB), 2008. <http://www.climatechange.ca.gov/inventory/index.html>. September.

ARB staff has projected 2020 unregulated GHG emissions, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions. ARB staff estimates the State-wide 2020 unregulated GHG emissions will be 596 million metric tons (MMT) of CO₂eq. GHG emissions in 2020 from the transportation and electricity sectors as a whole are expected to increase, but remain at approximately 38 percent and 23 percent of total CO₂eq emissions, respectively. The industrial sector consists of large stationary sources of GHG emissions and the associated percentage of the total 2020 CO₂eq emissions is projected to be 17 percent. The remaining sectors of GHG emissions in 2020 are high global warming potential gases at 8 percent, residential and commercial activities at 8 percent, agriculture at 5 percent, and recycling and waste at 1 percent.¹⁹

(4) Bay Area Emissions. The Bay Area Air Quality Management District (BAAQMD) established a climate protection program in 2005 to acknowledge the link between climate change and air quality. BAAQMD regularly prepares inventories of criteria and toxic air pollutants to support planning, regulatory and other programs. The most recent emissions inventory estimates greenhouse gas emissions produced by the San Francisco Bay Area in 2007.²⁰ The inventory updates BAAQMD's previous GHG emission inventory for the base year 2002, which was published in November 2006.

In 2007, 102.6 million metric tons of CO₂eq of greenhouse gases were emitted in the San Francisco Bay Area. Fossil fuel consumption in the transportation sector was the single largest source of the San Francisco Bay Area's greenhouse gas emissions in 2007. The transportation sector, including on-road motor vehicles, locomotives, ships and boats, and aircraft, contributed over 40 percent of greenhouse gas emissions in the Bay Area. The industrial and commercial sector (excluding electricity and agriculture) was the second largest contributor with 34 percent of total GHG emissions. Energy production activities, such as electricity generation and co-generation, were the third largest contributor with approximately 15 percent of the total GHG emissions. Off-road equipment, such as construction, industrial, commercial, and lawn and garden equipment, contributed 3 percent of GHG emissions.

(5) City of Benicia. In 2007, the City of Benicia adopted a resolution to act on climate protection and join the Local Governments for Sustainability (ICLEI) Cities for Climate Protection Campaign. The City received a Climate Change Protection Grant from BAAQMD to fund: 1) an emissions inventory, 2) a subsequent Climate Action Plan, and 3) concurrent staff training in climate change prevention and greenhouse gas reduction. The City completed the greenhouse gas emissions inventory in September 2008 and adopted greenhouse gas reduction targets for City government and the Benicia community as a whole.²¹ Emissions were provided for the baseline year of 2000 and the interim year of 2005. The emissions for the community inventory included the transportation, waste, residential, and commercial/industrial/other sectors. The community inventory showed that the City emitted a total of 4.0 MMT of CO₂eq in 2000, increasing to 4.2 of MMT in 2005. The commercial/industrial/other sector was the largest source of emissions at more than 94 percent. Businesses, including the Valero Refinery, generated 3.8 MMT of CO₂eq in 2000, increasing to 4.0 MMT of CO₂eq in 2005. Transportation was the next largest sector, responsible for 167,954 metric

¹⁹ California Air Resources Board (ARB), 2008. <http://www.arb.ca.gov/cc/inventory/data/forecast.htm>. September.

²⁰ Bay Area Air Quality Management District, 2008. *Source Inventory of Bay Area Greenhouse Gas Emissions*. December.

²¹ Benicia, City of, 2008. *Greenhouse Gas Emissions Inventory Report*. September.

tons of CO₂eq in 2000 and 158,346 metric tons of CO₂eq in 2005. Emissions from the residential sector decreased from 45,984 metric tons of CO₂eq in 2000 to 41,071 metric tons of CO₂eq in 2005. Waste disposal was responsible for 23,650 metric tons of CO₂eq in 2000, falling to 21,998 metric tons of CO₂eq in 2005. The forecasted increase of community-wide emissions from 2005 to 2020 is 5.1 MMT of CO₂eq, representing an approximately 21 percent increase. The adopted emission reduction target for the community is 10 percent below 2000 levels in 2020, or 3.6 MMT of CO₂eq.²² The City is currently developing a Climate Action Plan (CAP) that will identify strategies to meet the adopted targets. The CAP is scheduled for adoption by the City Council in the fall of 2009.

c. Regulatory Framework. The regulatory framework and other governmental activities addressing GHG emissions and global climate change are discussed in this section.

(1) Federal Regulations. There are no adopted federal regulations for GHG emissions. In February 2002, the United States government announced a comprehensive strategy to reduce the GHG intensity²³ of the American economy by 18 percent over the 10-year period from 2002 to 2012. This strategy has three basic components: (1) slowing the growth of emissions; (2) strengthening science, technology and institutions; and (3) enhancing international cooperation.²⁴

To meet this goal, the federal multiagency Climate Change Science Program (CCSP) was established to investigate natural and human-induced changes in the Earth's global environmental system; to monitor, understand, and predict global change; and to provide a sound scientific basis for national and international decision-making. The federal government established the multi-agency Climate Change Technology Program (CCTP) to accelerate the development and deployment of key technologies which offer great promise to reduce GHG emissions. The CCTP works closely with CCSP to make further progress in understanding and addressing global climate change. The United States Environmental Protection Agency's (EPA's) primary role in CCSP is evaluating the potential consequences of climate variability and the effects on air quality, water quality, ecosystems, and human health in the United States.

Currently there are no adopted federal regulations to control global climate change. However, recent court cases may change the voluntary approach to address global climate change and greenhouse gas emissions. On April 2, 2007, the United States Supreme Court ruled that the EPA has the authority to regulate CO₂ emissions under the federal Clean Air Act (CAA).

Over a decade ago, most countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), to begin to consider what can be done to reduce global warming and to cope with the physical and socioeconomic effects of climate change. More recently, a number of nations have ratified an amendment to the treaty: the Kyoto Protocol, which has a more powerful effect on its signatories. Because the Kyoto Protocol will affect virtually all major sectors of the economy, it is considered to be the most far-reaching agreement on the environment and sustainable development ever adopted. Most of the world's countries eventually agreed to the Protocol, but some nations (including the United States) chose not to ratify it.

²² Ibid.

²³ GHG intensity measures the ratio of GHG emissions to economic output.

²⁴ Environmental Protection Agency, 2008. Climate Change: Basic Information. www.epa.gov/climatechange/basicinfo.html.

As of July 2008, 182 countries have ratified the Kyoto Protocol. Participating nations are separated into Annex 1 countries (i.e., industrialized nations) and Non-Annex 1 countries (i.e., developing nations) that have different requirements for GHG reductions. The goal of the Protocol is to achieve overall emissions reduction targets for six GHGs by 2012. The six GHGs regulated under the Protocol are CO₂, CH₄, N₂O, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. Each nation must reduce GHG emissions by a certain percentage below 1990 levels (e.g., 8 percent reduction for the European Union, 6 percent reduction for Japan). The average reduction target for nations participating in the Kyoto Protocol is approximately 5 percent below 1990 levels.

(2) State Regulations. In 1967, the California Legislature passed the Mulford-Carrell Act, which combined two Department of Health bureaus, the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board, to establish the ARB. Since its formation, the ARB has worked with the public, the business sector, and local governments to find solutions to California's air pollution problems.

In a response to the transportation sector's significant contribution to California's CO₂ emissions, Assembly Bill 1493 (AB 1493, Pavley) was enacted on July 22, 2002. AB 1493 requires ARB to set GHG emission standards for passenger vehicles and light duty trucks (and other vehicles whose primary use is noncommercial personal transportation in the State) manufactured in 2009 and all subsequent model years. In setting these standards, the ARB considered cost effectiveness, technological feasibility, and economic impacts. ARB adopted the standards in September 2004. When fully phased-in, the near-term (2009 to 2012) standards would result in a reduction in GHG emissions of approximately 22 percent compared to the emissions from the 2002 fleet, while the mid-term (2013 to 2016) standards would result in a reduction of approximately 30 percent. To set its own GHG emissions limits on motor vehicles, California was required to receive a waiver from the EPA. In December 2007, the EPA denied the request from California for the waiver. However, on June 30, 2009, EPA granted the waiver of Clean Air Act preemption to California for its greenhouse gas emission standards for motor vehicles beginning with the 2009 model year. Notice of the decision was published in the Federal Register on July 8, 2009.

In June 2005, Governor Schwarzenegger established California's GHG emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals for the State of California: GHG emissions should be reduced to 2000 levels by 2010; GHG emissions should be reduced to 1990 levels by 2020; and GHG emissions should be reduced to 80 percent below 1990 levels by 2050.

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "Global Warming Solutions Act," passed by the California State legislature on August 31, 2006. This effort aims to reduce GHG emissions to 1990 levels by 2020. The ARB established the level of GHG emissions in 1990 at 427 MMT of CO₂eq. The emissions target of 427 MMT requires the reduction of 169 MMT from the State's projected business-as-usual 2020 emissions of 596 MMT. AB 32 requires ARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to global climate change. The Scoping Plan was approved by ARB on December 11, 2008, and includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other

measures.²⁵ Emission reductions that are projected to result from the recommended measures in the Scoping Plan are expected to total 174 MMT of CO₂eq, which would allow California to attain the emissions goal of 427 MMT of CO₂eq by 2020. The Scoping Plan includes a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. The Scoping Plan, even after Board approval, remains a recommendation. The measures in the Scoping Plan will not be binding until after they are adopted through the normal rulemaking process. The ARB rulemaking process includes preparation and release of each of the draft measures, public input through workshops and a public comment period, followed by an ARB Board hearing and rule adoption.

In addition to reducing GHG emissions to 1990 levels by 2020, AB 32 directed ARB and the newly created Climate Action Team (CAT)²⁶ to identify a list of “discrete early action GHG reduction measures” that can be adopted and made enforceable by January 1, 2010. On January 18, 2007, Governor Schwarzenegger signed Executive Order S-1-07, further solidifying California’s dedication to reducing GHGs by setting a new Low Carbon Fuel Standard. The Executive Order sets a target to reduce the carbon intensity of California transportation fuels by at least 10 percent by 2020 and directs ARB to consider the Low Carbon Fuel Standard as a discrete early action measure.

In June 2007 ARB approved a list of 37 early action measures, including three discrete early action measures (Low Carbon Fuel Standard, Restrictions on High Global Warming Potential Refrigerants, and Landfill Methane Capture).²⁷ Discrete early action measures are measures that are required to be adopted as regulations and made effective no later than January 1, 2010, the date established by Health and Safety Code (HSC) Section 38560.5. The ARB adopted additional early action measures in October 2007 that tripled the number of discrete early action measures. These measures relate to truck efficiency, port electrification, reduction of perfluorocarbons from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and sulfur hexafluoride (SF₆) reductions from the non-electricity sector. The combination of early action measures is estimated to reduce State-wide GHG emissions by nearly 16 MMT.²⁸

To assist public agencies in the mitigation of GHG emissions or analyzing the effects of GHGs under CEQA, including the effects associated with transportation and energy consumption, Senate Bill 97 (Chapter 185, 2007) requires the Governor’s Office of Planning and Research (OPR) to develop CEQA guidelines on how to minimize and mitigate a project’s GHG emissions. OPR is required to prepare, develop, and transmit these guidelines on or before July 1, 2009 and the Resources Agency is required to certify and adopt them by January 1, 2010. On April 13, 2009, OPR submitted its proposed amendments to the *CEQA Guidelines* to the Secretary of Natural Resources. These proposed amendments, which may be refined through a public process that is currently underway as of the summer of 2009, suggest that global climate change analyses in CEQA documents should be

²⁵ California Air Resources Board, 2008. *Climate Change Proposed Scoping Plan: a framework for change*. October.

²⁶ CAT is a consortium of representatives from State agencies who have been charged with coordinating and implementing GHG emission reduction programs that fall outside of ARB’s jurisdiction.

²⁷ California Air Resources Board, 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. October.

²⁸ California Air Resources Board, 2007. “ARB approves tripling of early action measures required under AB 32”. News Release 07-46. <http://www.arb.ca.gov/newsrel/nr102507.htm>. October 25.

conducted for all projects that release GHGs, and that mitigation measures to reduce emissions should be incorporated into projects, to the extent feasible. The proposed amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but preserve the discretion granted by CEQA to lead agencies in making their own determinations about the significance of environmental effects.

SB 375, signed into law on October 1, 2008, is intended to enhance ARB's ability to reach AB 32 goals by directing ARB to develop regional GHG emissions reduction targets to be achieved within the automobile and light truck sectors for 2020 and 2035. ARB will work with California's 18 metropolitan planning organizations to align their regional transportation, housing, and land use plans and prepare a "Sustainable Communities Strategy" to reduce the number of vehicle miles traveled in their respective regions and demonstrate each region's ability to attain its greenhouse gas reduction targets.

Additionally, SB 375 provides incentives for creating attractive, walkable, and sustainable communities and revitalizing existing communities. The bill exempts home builders from certain CEQA requirements if they build projects consistent with the new sustainable community strategies. The law is also intended to encourage the development of more alternative transportation options, to promote healthy lifestyles, and reduce traffic congestion.

2. Sustainability Setting

The following discussion summarizes concepts of sustainability from three sources: 1) the City of Benicia General Plan; 2) the State of California General Plan Guidelines; 3) the American Planning Association Policy Guide on Planning for Sustainability; and 4) the US Green Building Council's LEED for Neighborhood Development Rating System.

a. City of Benicia General Plan. The City of Benicia designates creating a sustainable community as "a primary goal and objective of the General Plan." The General Plan notes that sustainability "conveys long-term interdependent economic and environmental goals that promote efficient land use. It is a way of thinking and acting responsibly with respect to environmental, social, and economic issues at ever-widening levels of awareness or "integration." That is, what is done at the project or local level can affect all levels of the environment, including the local community, neighboring regions, the country, and the world."

The following characteristics or end results of sustainable planning are listed in the General Plan:

- Urban areas that reflect a long-term economic horizon;
- Efficient land patterns that are not overly energy-intensive;
- Places with sufficient linkages to the local and regional economy to assure long-term job creation and economic vitality;
- Support of ecologically-sensitive design features; and
- Placing value in the public realm.

b. State of California General Plan Guidelines. The State General Plan Guidelines address issues of sustainability in the context of encouraging communities to incorporate environmental

justice considerations (i.e., the fair treatment of people of all races, cultures and incomes with respect to environmental laws) into their long-term plans. In doing so, the General Plan Guidelines seek to translate the overarching goals of sustainability to community development by answering the question: What does sustainable development look like on the ground? The General Plan Guidelines note: “In a community that is developing sustainably, the neighborhood is the basic building block of urban design and is characterized by walkability, mixed-use development, and mixed-income housing.”

The General Plan Guidelines list the following sustainable development goals and policies (which include energy conservation):

- **Decrease urban sprawl** through: the promotion of compact, mixed-use, transit-oriented infill development; the restoration of urban centers; and limiting non-contiguous development.
- **Protect open space and working landscapes** through: conservation of agricultural lands and lands of scenic/recreational value; and using open space to define urban communities.
- **Protect environmentally sensitive lands** by conserving habitat lands and habitat connectivity; minimizing impacts to watershed functions; and avoiding natural hazards.
- **Create strong local and regional economies** by: encouraging a jobs/housing balance; providing adequate multi-income housing; encouraging the expansion of telecommunications infrastructure; and providing a fair and predictable land use planning process.
- **Promote energy and resources efficiency** through: supporting efficient industries and waste reduction programs; promoting alternative forms of transportation; and promoting energy- and resource-efficient buildings.
- **Promote equitable development** through: fair treatment under development policies and regulations; promoting mixed-income housing development; increasing access; promoting economic opportunity across the community; and protecting culturally significant sites.

c. Guides on Planning for Sustainability. The American Planning Association (APA) is the primary professional organization for those in the fields of metropolitan and regional development, community development, urban design, and environmental planning. APA’s Policy Guide on Planning for Sustainability is one of the most comprehensive policy-oriented approaches to sustainable development and was adopted by the APA Board of Directors in 2000. The APA Policy Guide links global un-sustainability indicators (e.g., global warming, declining fisheries, soil degradation, species extinction, and economic inequity) and un-sustainability indicators in the United States (e.g., suburban sprawl, segregation, loss of agricultural land and open space, traffic congestion, and loss of wetlands and degradation of water resources) to general policy objectives intended to promote sustainability. The intent of the APA Policy Plan is that these general objectives (listed below) be used to create and implement sustainability policies in a diversity of planning environments:

- Reduce dependence on fossil fuels, extracted underground metals and minerals.
- Reduce dependence on chemicals and other manufactured substances that can accumulate in nature.
- Reduce dependence on activities that harm life-sustaining ecosystems.
- Meet the hierarchy of present and future human needs fairly and efficiently.

The following 13 policy positions were developed on the basis of the general objectives:

1. Encourage alternatives to the use of gas-powered vehicles through public transit, alternatively-fueled vehicles, and bicycle and pedestrian-oriented design.
2. Encourage all types of development to use alternative energy sources and meaningful energy conservation measures.
3. Encourage development, agriculture, and other land uses that minimize the use of extracted underground minerals.
4. Encourage development and businesses to reduce the use of chemicals and synthetic compounds.
5. Encourage methods of landscape design, landscape and park maintenance, and agriculture that eliminate use of synthetic fertilizers and pest control and encourage the use of compost and water conservation.
6. Support compact and mixed-use development that minimizes the need to drive, and the reclamation of brownfield sites.
7. Conserve undeveloped land, open space, and agricultural land; consciously restore ecosystems and avoid disruptions to natural ecosystems and floodplains.
8. Encourage forms of development, business, and agriculture that reduce the use of water and employ innovative wastewater treatment.
9. Equitably protect public health, safety, and welfare.
10. Encourage businesses, communities, institutions, and development that pursue reduction and re-use of by-products and waste.
11. Encourage participatory and partnership approaches to planning that involve the local community.
12. Support partnerships and initiatives with other organizations that: support development of technologies that promote sustainability; and provide best available data for making informed decisions about development.
13. Support policies, programs, and legislation that improve sustainability.

d. USGBC LEED Neighborhood Development Rating System. The U.S. Green Building Council (USGBC) has developed Leadership in Energy and Environmental Design (LEED), an internationally recognized green building certification system. LEED provides a framework for identifying and implementing practical and measurable green building design features, including energy saving, water efficiency, and CO₂ emissions reductions. The LEED for Neighborhood Development Rating System (LEED-ND) extends the benefits of LEED beyond the building footprint into the neighborhood it serves and integrates the principles of smart growth, urbanism and green building into a national system for neighborhood design. LEED-ND is a collaboration among USGBC, the Congress for the New Urbanism and the Natural Resources Defense Council.

The benefits of developing a community to LEED-ND standards are to encourage healthy living, reduce urban sprawl, protect threatened species, and increase transportation choice and decrease automobile dependence. While a draft rating system is available and the program has undergone pilot testing, the LEED-ND rating system is still in the development process. The pilot program began in

2007, and the most recent comment period closed in June 2009. The rating system is anticipated to be available in 2009. As LEED-ND has not completed the development process, this EIR section will not use the rating system to evaluate the Specific Plan.

e. City of Benicia Lower Arsenal Mixed Use Specific Plan Policies. This section summarizes the Lower Arsenal Mixed Use Specific Plan policies and standards that specifically apply to global climate change, energy use, and sustainability within the Specific Plan area. These policies are summarized as follows:

- *Goal 1.* Restore the Lower Arsenal Mixed-Use Specific Plan area into a unified historic district through major restoration and rehabilitation of existing historic buildings, landscaping, open spaces, and the careful placement and integration of new structures.
 - *Action 1.1.8.* Establish a green building program and provide incentives to encourage construction of more environmentally-friendly buildings. Such incentives could include more flexible development standards, density bonuses, grants, permit expediting, and fee waivers.
 - *Action 1.3.1.* Develop Adams Street as a one-sided street that is industrial in character and that can continue to support a mix of industrial, artist live/work and work/live, commercial, and compatible uses to effectively showcase the area's signature historic buildings.
 - *Action 1.4.2.* Promote a mixed-use environment that continues the diverse combination of office, retail, light industrial, live/work and work/live, artisan, and residential uses in the Grant Street area.
 - *Action 1.6.2.* Maintain specimen trees, mature trees and ornamental landscaping, including lawn, shrubs, street trees, large oak and eucalyptus, and other appropriate plantings that surround key historic structures and act as canopies or boundary edges to historic landscapes.
 - *Action 1.6.3.* Permit removal of large trees only if a property is unduly constrained from development by their retention, and they are replaced at a higher ratio elsewhere on site.
 - *Action 1.6.4.* Establish a formal program to recognize the heritage trees. Develop special permit requirements for removal or alteration. Establish a green building program and provide incentives to encourage construction of more environmentally-friendly buildings. Such incentives could include more flexible development standards, density bonuses, grants, permit expediting, and fee waivers.
- *Goal 3.* Establish an integrated system of scenic trails, paths, and circulation routes to connect key destinations within the Arsenal Historic District and throughout the City.
 - *Policy 3.1.* Integrate multi-modal transportation planning with renovation of the Arsenal and pursue appropriate funding.
 - *Action 3.1.1.* Provide fully-connected and interesting streets, pedestrian paths, and bicycle paths to all key destination points in the Plan Area.
 - *Action 3.1.2.* Make pedestrian and bicycle circulation and safety improvements a high priority for transportation funding, utilizing locally generated revenues and State and Federal grants.
 - *Action 3.1.4.* If possible, require connections to the existing and proposed Bay Trail.
 - *Action 3.1.5.* Establish improved bus service to the Arsenal Historic District to and from Downtown. Consider more frequent all-day and special event shuttles between downtown and the Arsenal.
 - *Action 3.1.6.* If possible, require negotiation of public access easements on pedestrian stairways that are integral to pathways between historic sites and activity centers.
 - *Action 3.1.10.* Accommodate bicycle lanes in both directions on Military East Street by narrowing travel lanes and reducing on-street parking to one side of the street. Locate street trees outside of the planned right-of-way to accommodate bicycle lanes.
 - *Policy 3.2.* Protect Jefferson Street as the frontage road for the historic Officer's Row and develop and maintain as a key circulation route to the Jefferson Ridge / Officer's Row historic area.

- *Action 3.2.2.* Consider sidewalk easements on both sides of the street.
- *Action 3.2.3.* Continue the pedestrian sidewalk on the north side of Jefferson Street where missing and secure public access easements over private street segments.
- *Action 3.2.4.* Maintain the current linear alignment of the sidewalk and trees on Jefferson Ridge and provide a planting strip between the curb and sidewalk.
- *Action 3.2.5.* Consider a pedestrian/bicycle path along Jefferson Street, connecting the Officer's Duplex and Lieutenant's Quarters with the Commandant's Residence and Clocktower Building.
- *Action 3.2.6.* Define Cork Oak Ridge Park by a new east-west pedestrian path designed to terminate in the Officer's duplex to the west.
- *Action 3.2.10.* Design Park Road with the Bay Trail and with travel lanes to accommodate truck and bicycle lanes in both directions to facilitate its development as a primary access route.
- o *Policy 3.4.* Develop Grant Street as an intimate, pedestrian-friendly environment between the planned roundabout at the west entry and its connection to Adams Street on the east side.
- *Goal 6.* Ensure that public services keep pace with new development and that development pays its fair share of the cost of infrastructure.
 - o *Policy 6.2.* Work to safeguard public health, safety and prosperity by providing and maintaining facilities that enable the community to live in harmony with sustainable practices and natural systems.
 - *Action 6.2.1.* Provide for the efficient use of water through the use of natural drainage, drought tolerant landscaping, and recycling, with exception for plant and ornamental species that are perpetuated for historical purposes.
 - *Action 6.2.2.* Approve new development only when a dependable, safe and adequate water supply can be assured by the City.
 - *Action 6.2.3.* Ensure the availability of adequate wastewater treatment capacity prior to the approval of new development.
 - *Action 6.2.4.* Regulate drainage from new development so that post-development site peak flow rates are no greater than pre-development levels.
 - *Action 6.2.6.* Promote the use of recycling programs for residential, commercial and industrial development in order to meet the mandated objectives set forth in the California Integrated Waste Management Act.

3. Impacts and Mitigation Measures

This section evaluates significant impacts to global climate change that could result from implementation of the Draft Specific Plan. Mitigation measures are identified as appropriate. Impacts to energy use and sustainability are discussed inasmuch as they relate to global climate change.

a. Significance Criteria. The recommended approach for GHG analysis included in a June 2008 OPR Technical Advisory is to: (1) identify and quantify GHG emissions, (2) assess the significance of the impact on climate change, and (3) if significant, identify alternatives and/or mitigation measures to reduce the impact below a level of significance.²⁹ Neither the CEQA statute nor *CEQA Guidelines* prescribes thresholds of significance or a particular methodology for performing an impact analysis; as with most environmental topics, significance criteria are left to the judgment and discretion of the lead agency.

²⁹ California, State of, 2008. Governor's Office of Planning and Research. *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*. June 19.

The April 2009 OPR guidance provides some additional direction regarding planning documents as follows: “CEQA can be a more effective tool for greenhouse gas emissions analysis and mitigation if it is supported and supplemented by sound development policies and practices that will reduce greenhouse gas emissions on a broad planning scale and that can provide the basis for a programmatic approach to project-specific CEQA analysis and mitigation.... For local government lead agencies, adoption of general plan policies and certification of general plan EIRs that analyze broad jurisdiction-wide impacts of greenhouse gas emissions can be part of an effective strategy for addressing cumulative impacts and for streamlining later project-specific CEQA reviews.”

Pursuant to SB 97, OPR is in the process of developing guidelines for analysis of the effects of greenhouse gas emissions. As part of this process, OPR has asked ARB technical staff to recommend Statewide interim thresholds of significance for greenhouse gases. ARB released a preliminary draft staff proposal in October 2008 that includes initial suggestions for significance criteria related to industrial, commercial, and residential projects. The ARB anticipates adopting the proposal in 2009 to allow coordination with OPR’s efforts on global climate change.

Proposed *CEQA Guideline* amendments released by OPR included the following direction regarding the determination of significant impacts from GHG emissions (Section 15064.4):

(a) The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; or

(2) Rely on a qualitative analysis or performance based standards.

(b) A lead agency may consider the following when assessing the significance of impacts from greenhouse gas emissions on the environment:

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting.

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project’s incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

CEQA Guidelines Section 15064(b) provides that the “determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data,” and further, states that an “ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting.”

Some policy makers and regulators suggest that a zero emissions threshold would be appropriate when evaluating GHGs and their potential effect on climate change. Such a rule appears inconsistent with the State’s approach to mitigation of climate change impacts. AB 32 does not prohibit all new GHG emissions, rather, it requires a reduction in State-wide emissions to a given level. Thus, AB 32 recognizes that GHG emissions will continue to occur, and that increases will result from certain activities, but reductions would be required elsewhere.

Individual projects, such as those that would be developed as part of Specific Plan buildout, incrementally contribute to the potential for global climate change on a cumulative basis in concert with all other past, present, and probable future projects. While individual projects are unlikely to measurably affect global climate change, each of these projects incrementally contributes to the potential for global climate change on a cumulative basis, in concert with all other past, present, and probable future projects.

As the majority of GHG emissions result from fossil fuel combustion, a project’s impacts on global climate change and energy use are interrelated. In order to assure that energy implications are considered in project decisions, CEQA requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy. The environmental impacts of a project’s energy use should take into account energy requirements and its energy use efficiencies, the effects of the project on local and regional energy supplies, the degree to which the project complies with existing energy standards, and the effects of the project on energy resources.

The Specific Plan would result in significant global climate change or energy-related impacts if it would:

- Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases;
- Fail to contribute to increased energy efficiency; or
- Significantly increase the consumption of fuels or other energy resources to the extent that energy generation capacity is exceeded.

b. Impact Analysis. The following section provides an evaluation and analysis for the potential impacts of buildout of the Specific Plan for each of the criteria of significance listed above.

(1) Greenhouse Gas Emissions. Emissions estimates for the Specific Plan are discussed below. GHG emissions estimates are provided herein for informational purposes only, as there is not yet an established quantified GHG emissions threshold. Bearing in mind that CEQA does not require “perfection” but instead “adequacy, completeness, and a good faith effort at full disclosure,” the analysis below is based on methodologies and information available to the City at the time this EIR

was prepared. Estimation of GHG emissions in the future does not account for all changes in technology that may reduce such emissions; therefore, the estimates are based on past performance and represent a scenario that is believed to be worse than that which is likely to be encountered (after energy-efficient technologies have been implemented).

While information is presented below to assist the public and the City's decision makers in understanding the Draft Specific Plan's potential contribution to global climate change impacts, the information available to the City about specific development projects that would occur in the Plan Area is not sufficiently detailed to allow a direct comparison between particular project characteristics and particular climate change impacts, nor between any particular proposed mitigation measure and any resulting reduction in climate change impacts. For instance, there are numerous policies in the Draft Specific Plan that could reduce the energy consumption and associated GHG emissions of specific development projects. However, reductions in GHG emissions associated with these policies cannot be accurately identified in this program-level analysis without project-specific details. Specific development projects would be reviewed by City staff for compliance with these and other Specific Plan policies. At that time, the expected GHG emissions for individual projects could be quantified.

GHG emissions associated with Specific Plan buildout would occur over the short term from construction activities, consisting primarily of emissions from equipment exhaust. There would also be long-term regional emissions associated with Specific Plan-related vehicular trips and stationary source emissions, such as natural gas used for heating, and electricity used for cooling, lighting, and operation of equipment/appliances. Recognizing that the field of global climate change analysis is rapidly evolving, the approaches advocated most recently indicate that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water conveyance and treatment, waste generation, construction activities, and any other significant source of emissions within the Plan Area, if and when specific development projects are proposed.

GHG emissions generated by Specific Plan-related development would predominantly consist of CO₂. In comparison to criteria air pollutants, such as ozone and PM₁₀, CO₂ emissions persist in the atmosphere for a substantially longer period of time. While emissions of other GHGs, such as CH₄, are important with respect to global climate change, emission levels of other GHGs are less dependent on the land use and circulation patterns associated with anticipated land use development projects that would result from Specific Plan implementation than are levels of CO₂.

Construction Activities. Construction activities associated with specific development projects in the Plan Area, such as site grading, utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, asphalt paving, and motor vehicles transporting the construction crew, would produce combustion emissions from various sources. During construction of specific development projects, GHGs would be emitted through the operation of construction equipment and from worker and builder supply vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as CO₂, CH₄, and N₂O. Furthermore, CH₄ is emitted during the fueling of heavy equipment. Exhaust emissions from on-site construction activities would vary daily as construction activity levels change.

Buildout of the Specific Plan is anticipated to commence in 2010 and be completed by 2030. Precise construction timelines are not known, and emission estimates are based on the assumption that 1/20th of the total proposed Specific Plan development occurs in each year. Using the URBEMIS 2007

model, it is estimated that the total Specific Plan construction emissions would amount to approximately 152 metric tons of CO₂ per year.

Specific development projects undertaken in the Specific Plan area would be required to implement the construction exhaust control measures listed in Mitigation Measure AIR-1 of Section IV.C Air Quality. This measure would reduce GHG emissions during the construction period.

Motor Vehicle Use. Transportation associated with the Specific Plan would result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips. Mobile sources (vehicle trips and associated miles traveled) would be the largest emission source of GHGs associated with the proposed Specific Plan. Transportation is also the largest source of GHG emissions in California and represents approximately 38 percent of annual CO₂ emissions generated in the State. For land use development projects, vehicle miles traveled (VMT) and vehicle trips are the most direct indicators of GHG emissions associated with the Specific Plan. CO₂ and CH₄ emissions were estimated using trip generation data; estimates of N₂O were based on EPA emission factors. These emission estimates are shown in Table IV.N-2.

Energy Use. Buildings represent 39 percent of U.S. primary energy use and 70 percent of electricity consumption.³⁰ Development under the Specific Plan would increase the demand for electricity and natural gas due to the increased square footage of commercial development and additional dwelling units. Natural gas use results in the emissions of two GHGs: CH₄ (the major component of natural gas) and CO₂ from the combustion of natural gas. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy intensive. Preliminary estimates indicate that the total energy used to pump and treat this water exceeds 6.5 percent of the total electricity used in the State per year.³¹ Water-related energy use consumes 19 percent of California's electricity every year.³² Energy use and related GHG emissions are based on water supply and conveyance, water treatment, water distribution, and wastewater treatment. Water use estimates were generated based on usage factors from the Pacific Institute (a nonpartisan research institute that conducts interdisciplinary research that advance environmental protection, economic development, and social equity) and population, employment and square footage data related to development of the Specific Plan.³³ Greenhouse gas emissions related to electricity consumption were calculated based on data provided by the Energy Information Administration.

Solid Waste Disposal. Solid waste generated by Specific Plan buildout could contribute to GHG emissions in a variety of ways. Average waste generation rates from a variety of sources are available from the California Integrated Waste Management Board.³⁴ Landfilling and other methods of disposal use energy for transporting and managing the waste and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of

³⁰ United States Department of Energy, 2003. *Buildings Energy Data Book*.

³¹ California Energy Commission (CEC), 2004. *Water Energy Use in California* (online information sheet) Sacramento, CA, August 24. Website: energy.ca.gov/pier/iaw/industry/water.html. Accessed July 24, 2007.

³² California, State of, 2005. California Energy Commission. California's Water-Energy Relationship. November.

³³ Assumes wastewater flow is approximately 95 percent of water demand.

³⁴ California Integrated Waste Management Board, 2009. *Estimated Solid Waste Generation Rates*. Website: <http://www.ciwmb.ca.gov/wastechar/wastegenrates/>.

CH₄ from the anaerobic decomposition of organic materials. CH₄ is 25 times more potent a GHG than CO₂. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere. To determine the net GHG emissions from landfilling, the CO₂eq emissions from CH₄ generation, carbon storage (treated as negative emissions), and transportation CO₂ emissions were considered.

Other GHG Sources. At present, there is a federal ban on CFCs; therefore, it is assumed the Specific Plan-related development would not generate emissions of CFCs. Specific development projects that would result from Specific Plan buildout may emit a small amount of HFC emissions from leakage and service of refrigeration and air conditioning equipment and from disposal at the end of the life of the equipment. However, the details regarding refrigerants to be used within the Plan Area are unknown at this time. PFCs and sulfur hexafluoride are typically used in industrial applications, none of which is anticipated to be used within the Plan Area. Therefore, it is not anticipated that the Specific Plan would contribute significant emissions of these additional GHGs.

The Specific Plan would generate approximately 10,300 metric tons of CO₂eq emissions per year from commercial and residential uses, as shown in Table IV.N-2. Motor vehicle emissions are the largest source of GHG emissions at approximately 67 percent of the total Specific Plan emissions. Energy use, including electricity and natural gas, are the next largest category at a combined 23 percent of CO₂eq emissions. Solid waste generation and disposal is the remaining source of GHG emissions and comprises 10 percent of the total. These estimates do not include emission reductions that would occur from future emission reduction measures, such as alternative energy production or improved building requirements.

Table IV.N-2: Specific Plan Greenhouse Gas Emissions

Emission Source	Emissions (Metric Tons Per Year)				Percent of Specific Plan Total	Percent of Community-Wide Emissions By Source
	CO ₂	CH ₄	N ₂ O	CO ₂ eq		
Vehicles	6,700	0.190	0.690	6,910	67	4.36
Electricity Production	1,600	0.018	0.010	1,600	16	NA
Natural Gas Combustion	760	0.015	0.014	760	7	NA
Solid Waste	--	--	--	1,000	10	4.55
Total Annual Emissions	9,100	0.220	0.710	10,270	100	0.24

Note: Numbers in table may not appear to add up correctly due to rounding.

NA: Estimates not available for this pollutant and/or category.

Source: LSA Associates, Inc., July 2009.

(2) Comparison with Goals of Global Climate Change Plans. The California Environmental Protection Agency Climate Action Team (CAT) and the ARB have developed several reports to achieve the Governor’s GHG targets that rely on voluntary actions of California businesses, local government and community groups, and State incentive and regulatory programs. These include the CAT’s 2006 “*Report to Governor Schwarzenegger and the Legislature*,” ARB’s 2007 “*Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California*,” and ARB’s “*Climate Change Proposed Scoping Plan: a Framework for Change*.” The reports identify strategies to reduce California’s emissions to the levels proposed in Executive Order S-3-05 and AB 32. Table

IV.N-3 summarizes those strategies that may be applicable to the Specific Plan and assesses how the Specific Plan complies with those strategies.

Based on the analysis in Table IV.N-3, the Specific Plan would implement appropriate GHG reduction strategies and would not hinder or impede implementation of reduction goals identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor.

(3) Energy Efficiency/Reduce Greenhouse Gas Emissions. The California Energy Commission (CEC) was created by the Legislature in 1974 and is the State's primary energy policy and planning agency. The CEC has the following responsibilities:

- Forecast future energy needs and keeping historical energy data;
- License thermal power plants 50 megawatts or larger;
- Promote energy efficiency by setting the State's appliance and building efficiency standards and working with local government to enforce those standards;
- Support public interest energy research that advances energy science and technology through research, development, and demonstration programs;
- Support renewable energy by providing market support to existing, new, and emerging renewable technologies; providing incentives for small wind and fuel cell electricity systems; and providing incentives for solar electricity systems in new home construction;
- Implement the State's Alternative and Renewable Fuel and Vehicle Technology Program; and
- Plan for and direct State response to energy emergencies.

Energy-efficiency measures for both electricity and natural gas can significantly reduce greenhouse gas emissions. Energy Efficiency Standards (otherwise known as "Title 24 Standards") for residential and nonresidential buildings were established in 1978 in response to a legislative mandate to reduce California's energy consumption. California's building efficiency standards (along with those for energy efficient appliances) have saved more than \$56 billion in electricity and natural gas costs since 1978. The standards are updated to allow consideration and possible incorporation of new energy efficiency technologies and methods. The most recent update occurred when CEC adopted the 2008 Building Energy Efficiency Standards on April 23, 2008, and the Building Standards Commission approved them for publication on September 11, 2008. The new standards will take effect on January 1, 2010.

Table IV.N-3: Specific Plan Compliance with Greenhouse Gas Emission Reduction Strategies

Strategy	Specific Plan Compliance
<i>Energy Efficiency Measures</i>	
<p>Energy Efficiency Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities).</p> <p>Renewables Portfolio Standard Achieve a 33 percent renewable energy mix statewide.</p> <p>Green Building Strategy Expand the use of green building practices to reduce the carbon footprint of California’s new and existing inventory of buildings.</p>	<p>Compliant. Projects undertaken as part of Specific Plan buildout would be required to comply with the updated Title 24 standards for building construction. In addition, Action 1.1.8 would establish a green building program in the Plan Area. This program would encourage the construction of energy-efficient buildings that exceed Title 24 standards.</p>
<i>Water Conservation and Efficiency Measures</i>	
<p>Water Use Efficiency Continue efficiency programs and use cleaner energy sources to move and treat water. Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce GHG emissions.</p>	<p>Compliant. The Specific Plan includes Action 6.2.1, which would provide for the efficient use of water.</p>
<i>Solid Waste Reduction Measures</i>	
<p>Increase Waste Diversion, Composting, and Commercial Recycling, and Move Toward Zero-Waste Increase waste diversion from landfills beyond the 50 percent mandate to provide for additional recovery of recyclable materials. Composting and commercial recycling could have substantial GHG reduction benefits. In the long term, zero-waste policies that would require manufacturers to design products to be fully recyclable may be necessary.</p>	<p>Compliant. Preliminary data available from the California Integrated Waste Management Board (CIWMB) indicates that the City of Benicia has met the 50 percent diversion rate since 1999. The most recent year of available data (2006) indicates that the City has achieved a 61 percent diversion rate.</p>
<i>Transportation and Motor Vehicle Measures</i>	
<p>Vehicle Climate Change Standards. AB 1493 (Pavley) required the State to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004.</p> <p>Light-Duty Vehicle Efficiency Measures. Implement additional measures that could reduce light-duty GHG emissions. For example, measures to ensure that tires are properly inflated can both reduce GHG emissions and improve fuel efficiency.</p> <p>Adopt Heavy- and Medium-Duty Fuel and Engine Efficiency Measures. Regulations to require retrofits to improve the fuel efficiency of heavy-duty trucks that could include devices that reduce aerodynamic drag and rolling resistance. This measure could also include hybridization of and increased</p>	<p>Compliant. The Specific Plan does not involve the manufacture, sale, or purchase of vehicles. However, vehicles that operate within and access the Plan Area would comply with any vehicle and fuel standards that the ARB adopts.</p>

Table IV.N-3 *Continued*

Strategy	Specific Plan Compliance
<p>engine efficiency of vehicles.</p> <p>Low Carbon Fuel Standard. ARB identified this measure as a Discrete Early Action Measure. This measure would reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020.</p>	
<p>Regional Transportation-Related Greenhouse Gas Targets. Develop regional greenhouse gas emissions reduction targets for passenger vehicles. Local governments will play a significant role in the regional planning process to reach passenger vehicle greenhouse gas emissions reduction targets. Local governments have the ability to directly influence both the siting and design of new residential and commercial developments in a way that reduces greenhouse gases associated with vehicle travel.</p>	<p>Compliant. Specific regional targets for transportation emissions apply to regional transportation plans developed by Metropolitan Planning Organizations, such as the Metropolitan Transportation Commission. Therefore, these targets do not directly apply to the Specific Plan. However, the Specific Plan is intended to promote higher density infill development and enhance and improve the pedestrian environment, reducing reliance on automobile travel.</p>
<i>Other</i>	
<p>Measures to Reduce High Global Warming Potential (GWP) Gases. ARB has identified Discrete Early Action measures to reduce GHG emissions from the refrigerants used in car air conditioners, semiconductor manufacturing, and consumer products. ARB has also identified potential reduction opportunities for future commercial and industrial refrigeration, changing the refrigerants used in auto air conditioning systems, and ensuring that existing car air conditioning systems do not leak.</p>	<p>Compliant. New products used, sold, or serviced in the Plan Area (after implementation of the reduction of GWP gases) would be required to comply with future ARB rules and regulations.</p>

Source: LSA Associates, Inc., 2009.

CEC estimates that about 12 percent of California's retail electric load is currently met with renewable resources, including wind, solar, geothermal, and small hydroelectric resources. California's current Renewables Portfolio Standard (RPS) is intended to increase that share to 20 percent by 2010. Increased use of renewable resources will reduce California's reliance on fossil fuels and reduce emissions of greenhouse gases associated with electricity use. The AB 32 Scoping Plan developed by ARB anticipates that California will have 33 percent of its electricity provided by renewable resources by 2020.

Existing facilities and buildings within the Plan Area were constructed to meet Building Standards at the time of construction. Any future modifications, updates to existing buildings, or new construction will be required to meet the new standards, and therefore, will be more energy efficient. As discussed above, energy use at these facilities will also utilize electricity generated from a higher percentage of renewable resources, resulting in lower levels of GHG emissions. Therefore, development undertaken as part of the Specific Plan would achieve increased energy efficiency from existing facilities and would result in a less-than-significant impact to energy efficiency standards and the objective of reducing GHG emissions.

(4) Consumption of Energy Resources. Pacific Gas & Electric (PG&E) currently provides gas and electric services to residences and commercial development within the City of Benicia. PG&E provides natural gas and electric service to approximately 15 million people throughout a 70,000-square-mile service area in northern and central California. PG&E and other utilities in the State are regulated by the California Public Utilities Commission (CPUC).

The Specific Plan provides for development of a maximum of an additional 320,412 square feet of commercial and industrial development (including intensified uses in existing structures) and 22 new residences. Implementation of the Specific Plan would result in increased consumption of electricity and natural gas. Based upon consumption factors from the Energy Information Administration of the U.S. Department of Energy, the Specific Plan would require an additional 5,900 megawatt hours of electricity and 14 million standard cubic feet of natural gas per year over existing conditions, assuming no implementation of energy conservation measures.

The Specific Plan Area is currently serviced by electricity and natural gas. New and redeveloped mixed uses within the Plan Area are anticipated in the City's General Plan, as well as by the utility providers who coordinate future service demands with the City. As such, new and redeveloped uses that would occur with implementation of the Specific Plan are anticipated and, as a result, the additional energy demand discussed above would not exceed the available capacity. Therefore, the Specific Plan would have a less-than-significant impact on energy consumption, even without the implementation of energy conservation measures.

(5) Consistency with Sustainability and Energy Conservation Concepts. Table IV.N-4 includes a summarized evaluation of the Specific Plan's consistency with selected sustainability principles. The bulk of these principles derive from the policy positions outlined in the APA Policy Guide on Planning for Sustainability; however, the matrix also draws on the concepts of the Benicia General Plan, State General Plan Guidelines, local/regional planning documents, and other sources (including specific themes expressed in the City of Davis General Plan).

The purpose of the sustainability analysis is not to identify additional environmental impacts of the Specific Plan, but to provide a more complete understanding of the Specific Plan's environmental implications as they relate to long-term resource use. This section thus focuses on the physical aspects of sustainability and energy use as identified by the State of California, various cities, and planning organizations, and does not directly address equitable development and community justice (as issues that are distinct from general environmental protection). This analysis is not an exhaustive survey of the Specific Plan's effects on sustainability, but a way of understanding the Specific Plan's impacts from a multi-resource perspective. Recommendations are provided for ways to enhance the Specific Plan's sustainability.

The Specific Plan would result in a land use pattern and circulation system that would promote alternative transportation, including walking and bicycling. The viability of alternative transportation is one of the foundations of sustainability in that it has the potential to substantially reduce the use of non-renewable energy sources, as well as increase community health and social benefits. The use of alternative transportation would be supported by a land use pattern of moderately dense mixed-use development, with identifiable neighborhoods, interesting historic buildings, and safe pedestrian paths. The Specific Plan would encourage the development of multiple kinds of housing, ranging from live/work units for artists, to apartments over ground-floor retail spaces, to townhomes and

Table IV.N-4: Sustainability and Energy Conservation Matrix

Sustainability Principle	Discussion/Recommendation to Enhance Sustainability
<p>Encourage the use of alternative transportation.</p>	<p>The Specific Plan would be consistent with this sustainability principle. Although the Plan Area is already an eminently walkable area (with interesting buildings, outdoor spaces, mixed uses, and scenic views), pedestrian circulation in the area is diminished by the lack of sidewalks on certain streets, a shortage of pedestrian pathways that connect the upper part of the site to the lower part of the site, and a complicated street system with inadequate signage. No bike paths or lanes are located in the Plan Area, and Benicia Breeze does not serve the Lower Arsenal.</p> <p>The use of alternative transportation modes in the Plan Area would be substantially enhanced by the Specific Plan through: 1) completion of missing sidewalk segments along Grant Street, Adams Street, Park Road, and Polk Street; 2) the development of new off-street paths through the Jefferson Ridge open space from Adams Street south to Grant Street, and from Grant Street to Polk Street; 3) the improvement of existing stairs throughout the Plan Area; 4) the development of 5-foot bike lanes on Park Road and Military East; 5) the development of new north/south and east/west streets that would break up larger blocks and encourage pedestrian/bike access; 6) support of new bike routes to connect the Plan Area to Downtown Benicia and extend the Bay Trail south of the Plan Area; and 7) support of improved transit connections between the Plan Area and Downtown. However, it should be noted that the development of new pedestrian and bike paths in the Plan Area may require the acquisition of easements or property; new circulation facilities would also be required to comply with Americans with Disabilities Act (ADA) requirements.</p> <p>In addition, the Plan requires that parking be provided within a district-wide solution, which would further encourage visitors to the Plan Area to park once, and then walk to multiple destinations – further reducing automobile reliance. The Specific Plan scores very well on this sustainability principle; no further recommendations are needed.</p>
<p>Encourage the use of alternative energy sources and energy conservation.</p>	<p>The Specific Plan would be consistent with this sustainability principle. Energy use for transportation accounts for approximately 28 percent of total energy use in the United States, according to the US Energy Information Administration. Therefore, the Specific Plan, which would promote the use of alternative transportation (including bike/pedestrian access and transit), would promote energy conservation. In addition, rehabilitating existing buildings is far more energy efficient than constructing new ones – even “green buildings” (which still require the extraction, processing, and assembly of raw materials). Action 4.8.1 of the Specific Plan, which would provide financial incentives for the adaptive re-use of buildings, would also reduce energy usage. Action 1.1.8 would establish a green building program in the Plan Area, to encourage construction of environmentally-friendly buildings (which would also be energy-efficient). This action would also likely conserve energy in the long-term.</p> <p>However, the Specific Plan would not directly promote the use of alternative energy sources. The following recommended Action would encourage use of alternative energy:</p> <p><u>Recommended Action 6.2.11:</u> Use subsidies, expedited permit processing, density bonuses or other incentives to support the installation and use of photovoltaic cells and other renewable energy technologies to provide a portion of the Plan Area’s energy needs.</p>

Table IV.N-4 *Continued*

Sustainability Principle	Discussion/Recommendation to Enhance Sustainability
<p>Encourage development and land uses that minimize the use of extracted underground minerals and synthetic chemicals.</p>	<p>The Specific Plan would be generally consistent with this sustainability principle. As noted in the energy conservation discussion, above, the rehabilitation of existing buildings (which would be promoted by numerous goals, policies, and actions in the Specific Plan) would save energy by re-using and recycling building materials. Re-using and recycling building materials would also reduce the demand for mined materials, including aggregate (used to make concrete) and metals. The promotion of alternative transportation would also reduce demand for gasoline, which is derived from extracted underground minerals. Therefore, the Specific Plan would meet this sustainability principle.</p> <p>However, no goals, policies, or actions directly pertain to using organic methods to maintain open space within the Plan Area. In the absence of such policies, fertilizers, pesticides, and herbicides may be applied within the Plan Area. Many fertilizers are made with petroleum inputs; pesticides and herbicides all rely on synthetic chemicals. The following recommended Action would reduce the use of mined and synthetic materials in landscaped areas:</p> <p>Recommended Action 6.2.12: Develop and implement a beyond-organic landscape maintenance plan for the Plan Area. The landscape maintenance plan shall include the following components:</p> <ul style="list-style-type: none"> • An Integrated Pest Management Plan (IPM), which will include methods of pest prevention that specify the use of pesticides only as a last resort in pest control. • The promotion of landscape plant species that are naturally resistant to drought and pests.
<p>Support the reclamation of brownfield sites.</p>	<p>The Specific Plan would be consistent with this sustainability principle. Although portions of the Plan Area have been subject to relatively minor levels of soil and groundwater contamination associated with historic land uses, none of the sites in the Plan Area are officially characterized as “brownfields” (a term referring to areas with high levels of contamination that would require significant remediation). Although some site-specific asbestos and lead remediation may be required when individual sites in the Plan Area are redeveloped, no large-scale remediation plans would be required (all remediation would be covered by existing federal, State, and local hazardous materials regulations).</p> <p>However, the Specific Plan would result in new development on infill parcels, which – like the reclamation of brownfields – could reduce development pressures on greenfield sites. The minor remediation that would occur in the Plan Area would improve environmental quality in the area and enable the development of dense, mixed-use neighborhoods.</p>

Table IV.N-4 *Continued*

Sustainability Principle	Discussion/Recommendation to Enhance Sustainability
<p>Conserve undeveloped land and reduce disruptions to natural ecosystems.</p>	<p>The Specific Plan would be generally consistent with this sustainability principle. Important areas of open space in the Plan Area – most notably the sloping hillside with the heritage cork oaks south of Jefferson Street, and Officers’ Square – would be preserved as part of the Specific Plan. In general, the Specific Plan is protective of existing biological resources: important groves of trees (and individual trees) would be preserved and grading would be minimized through the preservation of large areas of steep slopes and the construction of relatively small-footprint buildings.</p> <p>The site contains approximately 0.18 acres of seasonal wetlands, which are likely associated with remnant drainages or historic cut/fill operations. Some of these wetlands could be affected by construction in the Jefferson Ridge/Officers’ Row Zone. Although these wetlands are not expected to be suitable for use by protected amphibians like California red-legged frog, they are likely used by a variety of local wildlife. The Specific Plan designates four “Potential Stormwater Quality Areas,” three of which would be located on Jefferson Ridge. Although the location of these storm water treatment areas on Jefferson Ridge does not exactly coincide with the location of the existing seasonal wetlands, the wetlands could be preserved and incorporated into the storm water quality areas. The preservation of the wetlands would avoid disruption to natural ecosystems. The costs for protection and maintenance of these wetlands should be provided by individual development projects.</p> <p>The following recommended action would preserve the existing wetlands:</p> <p><u>Recommended Action 6.2.13:</u> Incorporate the existing seasonal wetlands in the Plan Area into an area-wide storm water management plan. Consider enhancing the ecological function of the remnant wetlands through removal of exotic plant species and replacement of removed plants with natives.</p>
<p>Encourage development and land uses that reduce the use of water and employ innovative wastewater management.</p>	<p>The Specific Plan would be consistent with this sustainability principle. The land uses that would be encouraged by the Specific Plan – a moderately-dense mix of residential, retail, and industrial uses – are inherently water-efficient. The urban neighborhoods envisioned around Adams Street, Grant Street, and south of Grant Street do not include large areas of turf or other landscaping that requires large amounts of irrigation. Open space throughout the Plan Area would be largely provided by public parks and squares that would be shared by the occupants of the Plan Area. In general, these open spaces would be landscaped with species that are generally tolerant of Benicia’s Mediterranean climate, such as coastal live oak (<i>Quercus agrifolia</i>), California cottonwood (<i>Populus fremontii</i>), and fruitless olive (<i>Olea</i>). Therefore, the Specific Plan would support the principle of reducing water use. The Plan Area and surrounding areas could employ innovative wastewater management: they are located near an existing wastewater treatment plant, which itself is located near the Carquinez Strait shoreline. Wastewater could be routed to a series of restored wetlands, where it could be naturally treated by wetland vegetation and then released, similar to the ecological wastewater treatment program employed by Arcata, California (see the Arcata Marsh and Wildlife Sanctuary website: http://www.humboldt.edu/~ere_dept/marsh/). However, such a program is a complex, expensive, and land-intensive undertaking, and would likely need to be undertaken on a City-wide basis. In addition, the use of wetlands for wastewater treatment in Benicia is not legally authorized. Therefore, no recommendation is made for Plan-wide innovative wastewater management to be implemented, although small-scale gray water programs should be encouraged.</p> <p><u>Recommended Action 6.2.14:</u> Encourage the incorporation of low-cost gray water reuse features in residential, commercial, and industrial development. Appropriate features could include dual waste collection plumbing (to use sink water to flush the toilet), outdoor gray water irrigation systems, and rainfall catch basins/cisterns. Localized gray water recycling could be encouraged via building/development incentives, providing free technical assistance, or revising the local building code.</p>

Table IV.N-4 *Continued*

Sustainability Principle	Discussion/Recommendation to Enhance Sustainability
Promote the production and consumption of local food .	<p>The Specific Plan does not address this sustainability principle. While eating locally has become somewhat of a buzzword recently, it is an important component of sustainability. Consuming food grown locally has several environmental benefits, including: keeping local farms economically viable, which preserves rural landscapes; and substantially reducing energy costs associated with food transport. In addition, local farms can often be held more accountable for their negative externalities (because the environmental impacts of fertilizer, herbicide, and pesticide use are experienced locally by those purchasing food). Many aspects of local food production and consumption are beyond the reach of the Specific Plan. These aspects include consumer preference, the ongoing conversion of agricultural land in Solano County, and the global economics of food production. However, there are actions that could be incorporated into the Specific Plan to support local food:</p> <p>Recommended Action 6.2.15: Undertake the following actions to promote the production and consumption of local food:</p> <ul style="list-style-type: none"> • Residential developments should allocate space for gardening by residents. This measure could be achieved by allocating a portion of existing open space in the Plan Area to community fruit/vegetable gardens, as long as the design integrity of historic spaces is maintained. • When feasible (e.g., when the population of the Lower Arsenal reaches critical mass), consider bringing a weekly farmer’s market to the Plan Area.
Encourage businesses and development that pursue re-use of waste products .	<p>The Specific Plan would be generally consistent with this sustainability principle. The Specific Plan is generally consistent with this principle, namely because it strongly promotes the rehabilitation of existing buildings. Demolition and construction are wasteful enterprises, from both a materials and energy point of view. The re-use of old buildings is an important way to reuse existing materials. In addition, the General Plan would encourage recycling through Action 6.1.6, would promote the use of recycling programs to meet State waste-reduction strategies. Allied Waste, Benicia’s waste and recycling provider, provides yard waste recycling, but not recycling of food scraps. However, food waste may account for a relatively large proportion of waste generated by residents, restaurants, and other businesses in the Plan Area. Creating a local site for composting food waste would represent a relatively inexpensive, space-efficient way to reduce waste in the Plan Area. In addition, as indicated in Recommended Action 6.2.12 (which includes a provision for recycling food waste), compost generated by the operation could be used to fertilize on-site open spaces.</p>
Equitably protect public health, safety, and welfare.	<p>The Specific Plan would be consistent with this sustainability principle. The Specific Plan would generally bring compatible and beneficial development to the Plan Area. Parks and open space would be located in all zones, and additional roadways and paths would be built throughout the area that would better connect the live-work lofts in the South of Grant Zone to the mansions on Jefferson Ridge. Key natural amenities in the Plan Area – such as the cork oaks on Jefferson Ridge – would be preserved and accessible to all residents and employees of the Plan Area and Benicia. The Specific Plan also includes special policies to attract and support artists, a group that is ill-accommodated by conventional, market-rate housing. Housing types permitted in the Plan Area would range from live/work units to apartments over retail units, to townhomes, and would expand the range of housing choices available in Benicia. The Specific Plan, which would generally protect environmental resources, promote sustainable development, and offer a wide range of housing opportunities, would equitably protect public health, safety, and welfare.</p>

condominiums. A diverse range of housing types would increase habitation options for Benicia residents and should accommodate a broad range of income groups. The Specific Plan would support the following characteristics of sustainable planning outlined in the Benicia General Plan:

- *Urban areas that reflect a long-term economic horizon.* The Specific Plan would allow for economic change (through flexible building space and adaptable transportation patterns) while preserving key historic and biological resources.
- *Efficient land patterns that are not overly energy-intensive.* Proposed land use patterns emphasize mixed uses and support alternative transportation. The reuse of the Plan Area, where urban development has existed for approximately 150 years, is more efficient than the land use patterns that would occur under existing zoning.
- *Places with sufficient linkages to the local and regional economy to assure long-term job creation and economic vitality.* Development in the Plan Area would create an important and sustainable source of local jobs in close proximity to Downtown.
- *Support of ecologically-sensitive design features.* Heritage trees and key areas of open space would be preserved. Landscape-style storm water management features would be incorporated into the design of new development.
- *Placing value in the public realm.* Well-designed public spaces – including Officers’ Square and numerous smaller parks, plazas, and streetscapes – are central components of the Specific Plan.

The recommendations detailed in Table IV.N-1 would enhance the sustainable aspects of the Specific Plan; however, the Specific Plan, in its current form, substantially realizes key sustainability precepts.

4. Impacts to the Proposed Specific Plan from Global Climate Change

Local temperatures could increase in time as a result of global climate change with or without the development envisioned under the Specific Plan. This increase in temperature could lead to other climate effects, including, but not limited to, increased flooding due to increased precipitation and runoff, and a reduction in the Sierra snowpack. At present, the extent of climate change impacts is uncertain, and more extensive monitoring of runoff and snowpack is necessary for an understanding of pending changes in hydrologic patterns. Studies indicate that increased temperatures could result in a greater portion of peak streamflows occurring earlier in the spring, with decreases in late spring and early summer.³⁵ These changes could have implications for water supply, flood management, and ecosystem health.

While sea level rise estimates vary, the analysis in Section IV.D, Hydrology and Water Quality, assumes a 1 meter rise in sea levels by 2100. Based on this assumption, and taking into account storm surge effects, the 100-year tide level would increase from 6.5 feet National Geodetic Vertical Datum (NGVD) to 9.8 feet NGVD. The Plan Area, which ranges in elevation from approximately 25 feet above mean sea level (amsl, which is roughly equivalent to NGVD) to 110 feet above mean sea level, would not be inundated under this scenario. The lowest point in the Plan Area would be still more than 30 feet clear of the 100-year tide level.

³⁵ United States Global Change Research Program, 2001. Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change.

BCDC has undertaken a Climate Change Planning project that includes goals to: (1) identify strategies for adapting to climate change; (2) develop a regional task force to inform and coordinate local governments, stakeholders, and land use planning bodies in the Bay area regarding approaches for adapting to global climate change; and (3) identify the findings and policies in the San Francisco Bay Plan pertaining to climate change and update other relevant Bay Plan policies to incorporate new information about the impacts of climate change. In October 2007, BCDC released a report describing a comprehensive eight-year Bay Area regional strategy for controlling greenhouses and planning for the impacts of sea level rise.

Most of California's precipitation falls in the northern part of the State during the winter. A vast network of man-made reservoirs and aqueducts capture and transport water throughout the State from northern California rivers, as the greatest demand for water comes from users in the southern part of the State during the spring and summer.³⁶ The current distribution system relies on Sierra Nevada mountain snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

Some models predict drier conditions and decreased water flows, while others predict wetter conditions in various parts of the world. If heat-trapping emissions continue unabated, more precipitation is likely to fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent over the next 100 years.

The City of Benicia's Urban Water Management Plan provides water demand projections based on growth anticipated by the City's General Plan. Demand associated with new and redeveloped uses within the Plan Area is not anticipated to exceed the City's available water supply. Action 6.2.2 of the Specific Plan would ensure that new development within the Plan Area would not be approved unless adequate water supply can be assured by the City.

The City of Benicia operates and manages its own water system, including a Water Treatment Plant located near Lake Herman Road. Untreated water from the City's supply sources is conveyed to the WTP. The City provides treated water to approximately 9,182 customers within the City for residential, commercial, industrial, and irrigation uses. The City's water supply comes primarily from contracts and agreements held through the State Water Project (Sacramento Delta) and the Solano Water Project (Lake Berryessa). Approximately 80 percent of the City's water comes from the Sacramento River Delta and approximately 20 percent comes from Lake Berryessa.

Where precipitation is projected to increase in California, the increase would mainly occur in Northern California. However, various California climate models provide mixed results regarding changes in total annual precipitation in the State through the end of this century; therefore, no conclusion on an increase or decrease can be made. Considerable uncertainties about the effects of climate change on California hydrology and water resources will remain until there is more consistent information about how precipitation patterns, timing, and intensity will change.³⁷ The plans and programs implemented by the City of Benicia, as well as the State Water Project, are intended to

³⁶ California Climate Change Center, 2006. *Our Changing Climate. Assessing the Risks to California*. July.

³⁷ California, State of. Department of Water Resources, 2006. *Progress on Incorporating Climate Change into Management of California's Water Resources*. July.

ensure that sufficient water supply will be available to all users within the region in future years. Therefore, the potential effects of climate change (e.g., sea level rise, water supply, etc.) due to potential Specific Plan-related development would be less than significant.

